News of the Industry Begins Page 952

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Volume 61
Number 26

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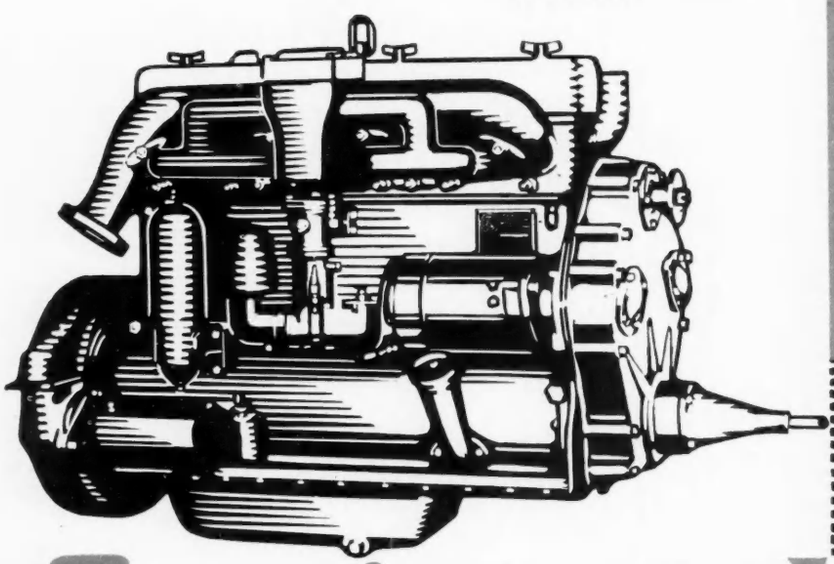

Continental Motors

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

Reg. U. S. Pat. Off.
Established 1902

Vol. 61 No. 26

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AUTOMOTIVE INDUSTRIES

VOLUME 61 *Philadelphia, Saturday, December 28, 1929* NUMBER 26

Steel Sales Boosted to High Level By *Automotive Demand*

Iron and non-ferrous metals find ready market during first eight months, making up largely for depression suffered as year drew to a close.

By WILLIAM CRAWFORD HIRSCH

IT is to the bulge in automotive consumption of iron, steel and non-ferrous metals during the first eight months of 1929 that the producers of these commodities are indebted for a gratifying increase in their 1929 sales volume over that of the preceding year, and this in spite of the all-around paucity of business during the year's closing months. Measured on the more or less theoretical basis of ingot output, steel production in 1929 is generally estimated to have attained the grand total of 55,000,000 tons, an increase of 10 per cent over the preceding year's record and more than five times the normal annual production in the early days of the automobile industry at the beginning of the century.

The output of finished rolled steel in 1929 in round figures approximates 40,000,000 tons of which more than 8,000,000 tons found its way into automobile and motor truck manufacture, as compared with 6,700,000 tons in 1928. The more typically automotive descriptions of finished steel made a still more impressive showing. Sheet production in the first nine months of 1929 was approximately 15 per cent higher than during the corresponding period of 1928, but for week upon week during their heyday season, motor car manufacturers and parts makers absorbed tonnages denoting a much greater increase in their requirements. When a few weeks ago orders for strip-steel declined so sharply that mills found it difficult to employ more than one-third of their capacity, it was freely stated that upward of 60 per cent of the total strip-steel consumption was automotive in character, and that when this recedes to negligible proportions, there isn't very much left.

Automotive takings of steel during the first half of the year at times were sufficiently heavy to cause somewhat of a tight fit between the demand and the supply of semi-finished material to sheet and strip rollers. At no time, however, was there any actual scarcity of steel. Finishing capacity, moreover, although during the peak of demand under considerable strain, was at all times

THE NEW YORK SHOW OPENS NEXT WEEK

UNDER the auspices of the National Automobile Chamber of Commerce, with the co-operation of the Motor and Equipment Association, the Thirtieth Annual Automobile Show season will be opened next Saturday afternoon, January 4th, in the Grand Central Palace, New York City. While the exhibits will be predominantly of American manufacture, a number of foreign makers have reserved space for the week.

While the majority of the new cars to be shown will be described in AUTOMOTIVE INDUSTRIES ***of January 4th, we are able to present in this week's issue pre-Show announcements of the Franklin, Graham-Paige, Peerless and Reo Flying Cloud passenger cars, as well as the Willys-Overland commercial line.***

equal to the task of reasonably prompt deliveries.

For a year in which the crest of the demand presented so sharp a contrast with the bottom, steel prices ruled impressively steady. Ups and downs hardly ever exceeded in extent $1 or $2 per ton, and even when there is much greater uniformity in the volume from month to month than there was in 1929, fluctuations of $1 or $2 per ton are nothing out of the ordinary. The market for semi-finished material reflected the fluctuations in the demand more so than did the price movement of finished steel. At the beginning of the year billets were quoted at $33 and sheet bars at $34. By March the momentum of sheet and strip demand had attained sufficient speed to send the price of sheet bars to $35 and that for billets to $34. The market hardened further and by May $36 was being asked for both descriptions. From then on an easier tendency set in, and at the end of the year the market for sheet bars nominally is at $35 and that for billets at $34, with rumors of shading of these prices, so that the market is very nearly at the point it started out from at the year's beginning. The narrow movement outlined by this course of semi-finished prices covers in a broad way the history of 1929 prices in the market for finished steel.

Prices Stabilized in 1929

From this it may be deduced that price stabilization of the steel market in 1929 was accomplished in spite of the sharp ups and downs in demand. It would be shortsighted to interpret this stabilization as having resulted altogether from improved morale among steel sellers. Automotive consumers of steel had as much to do with this reform as did steel producers. Under the old dispensation in the steel market, a downtrend in demand and in backlogs was the signal for the general run of consumers to postpone purchases and thereby to make sellers, who were eager for business, pliable in their price views. Here and there a small mill would trim prices and finally the larger producers were compelled to revise prices downward. The right price was the highest price which producers could obtain, when demand was heavy, and the lowest price, which consumers could squeeze out of small mills through their aloofness, when demand tapered off. It was the acquiescence of representative buyers among the automotive consumers of steel, in prices alike fair to themselves, and to the steel producers, and their unwillingness to hammer the market in dull times (just as they resisted energetically price advances based on nothing more than better demand), that has made possible such a picture of price stability as the steel market presented in 1929. Old-time steel consumers in non-automotive industries find it difficult to adjust themselves to this changed order of things, and they never miss an opportunity to chide automotive consumers for having upset time-honored traditions and for buying steel with a view solely to their manufacturing schedules and not to rigging the market so as to save a few dollars per ton.

Capacity Increased

A marked increase in rolling and finishing capacity made it possible for peak demand for sheets and strip-steel to be satisfied without very much delay in shipments. Installations of the continuous rolling process continued at an impressive rate. Judge E. H. Gary, chairman of the U. S. Steel Corporation's Board, emphasized time and again during his lifetime that one of the steel industry's burdens was to anticipate the market's requirements by at least five or six years. Rolling mills cannot be put up overnight. The many plant expansions completed in 1929, plus those now under way and others definitely decided upon as part of the steel industry's 1930 program, will enhance capacity to a marked degree. Although worth while economies in production costs are naturally the outstanding motive back of the huge appropriations which steel manufacturers are making for plant extensions and improvements, the necessity of satisfying peak demand without too long gaps between booking of the order and shipment has been an added influence in the adoption of this enlargement program.

The steel industry recognizes today that in the immediate future automotive consumption is very likely to be featured by recurrent periods of intensive demand and others of just as intensive dullness. Making-over and modernizing of mills will afford more flexibility to cope with this ebb-and-tide condition. Under these circumstances, it is hardly likely that price levels of the immediate future will be greatly affected by the resulting production cost economies. Consumers must expect to share in the cost of the necessary capital outlay, and what price benefits will eventually accrue to them will probably be gradual and spread over many years.

Pig iron output in 1929 will total in the neighborhood of 42,000,000 tons, compared with 38,000,000 tons in round figures in the preceding year. A greater increase in the year's melt by automotive foundries than indicated by these figures is certain to have taken place, a much larger percentage of scrap having entered into the making of steel, thus leaving correspondingly more of the blast furnace product to be accounted for by foundry consumption. Sales of all of the ferro-alloys entering into automotive alloy steels showed gains in 1929. Pig iron prices ruled steady throughout the year, with 50 cents to $1 per ton advance, established in the spring, fairly well maintained during the year's remaining period.

Non-Ferrous Consumption Higher

Automotive consumption of aluminum, which the Minerals Division of the Department of Commerce estimates to have been 25,000 tons in 1928, or 27.7 per cent of the total production, increased in 1929 in proportion to the greater number of automotive units marketed. Aluminum prices remained unchanged from those of 1928.

With a consumption of approximately 145,000 tons, the automotive industry continued in 1929 to be the copper producers' second best customer, their takings being exceeded only by those of the electrical industry. While for a few weeks in March and April prices rose to the highest levels in years, the pegged 18-cent price prevailed during the last eight months.

Tin prices moved within a wide range in 1929. At one time in February the market was at around 50 cents while in December it dipped at below 40 cents. Tin deliveries from abroad rose close to 90,000 tons, a record-breaking figure and one chiefly accounted for by increased automotive consumption which is estimated to have called for 21,750 tons.

The year's lead market showed a high of 7.75 cents per lb. New York basis, and a low of 6.25 cents. Automotive consumption absorbed approximately 175,000 tons, chiefly in storage batteries.

Nickel prices remained on an even keel throughout 1929. Because of the wider uses to which nickel steel is put in automotive construction, it is thought that the 1928 consumption of 14,000,000 lb., or 28 per cent of the 1928 consumption, has been considerably enhanced.

More Salesmen Become Dealers in Automobiles During Year

Proportion of experienced car merchandisers who established new dealerships increases as numbers of other employees in the industry drop in 1929.

By LESLIE PEAT

TWENTY-FIVE per cent more retail automobile salesmen and sales managers have opened dealerships in the United States thus far this year than during 1928.

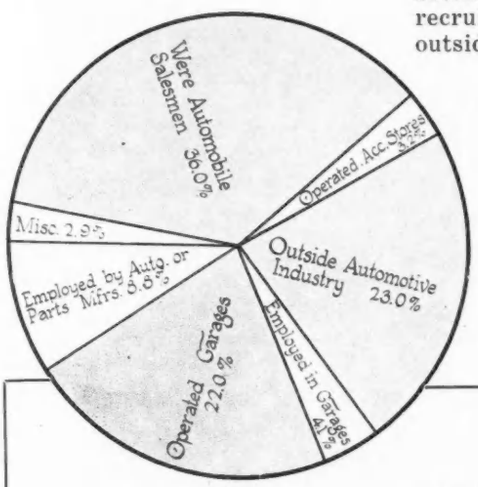
Of every 1000 new dealers reported in the country this year, about 300 were previously operating under the same management as at present but were listed as new because of a change in franchise or a change in corporate name. About 700 were new dealers, that is, men who had never had experience as owners of a retail car establishment. Of this latter group, 45 per cent, or about 315 men per 1000, had had sales experience in the automobile retail field, as compared with about 252 per 1000, or 36 per cent in this classification of every 1000 reported in 1928.

The year 1929 showed approximately the same percentage of new dealers had come from fields other than automotive as were recruited from outside fields in 1928.

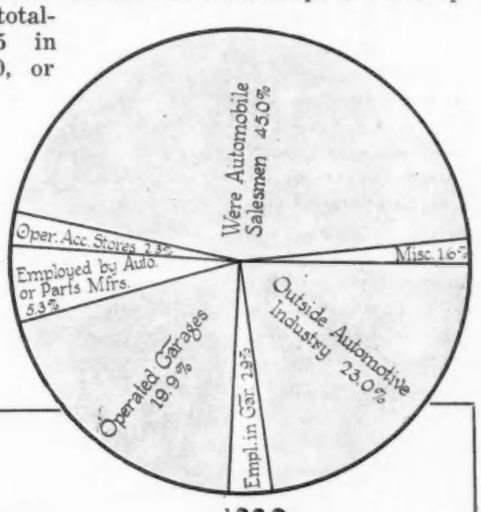
About 140 of every 1000 new dealers had been proprietors of garages and repair shops before entering the retail car selling field, the 1929 figures showed. This was a drop of nearly 12 per cent under the 1928 figure, which indicates that about 22 per cent had been in the garage and repair business before venturing in automobile retailing.

About 29 new car dealers in every 1000 entered the field directly from employment in automobile and automotive parts and accessory manufacturing concerns, and about 20 of every 1000, representing nearly 3 per cent of the total, were formerly mechanics and other garage employees.

Twenty-five accessory stores were turned into automobile dealer establishments per 1000 reported during 1929, or about 2½ per cent of the total. Automotive wholesalers who turned their businesses into automobile dealerships, or who established dealerships and are operating both, totaled about 15 in every 1000, or about 1½ per cent of the total of new dealerships in the United States, the 1929 reports show.


Were Automobile Salesmen 36.0%
Operated Acc. Stores 3.2%
Outside Automotive Industry 23.0%
Employed in Garages 4.1%
Operated Garages 22.0%
Employed by Auto. or Parts Mfrs. 8.8%
Misc. 2.9%

1928


Were Automobile Salesmen 45.0%
Oper. Acc. Stores 2.3%
Misc. 1.6%
Employed by Auto. or Parts Mfrs. 5.3%
Outside Automotive Industry 23.0%
Empl. in Gar. 2.9%
Operated Garages 19.9%

1929

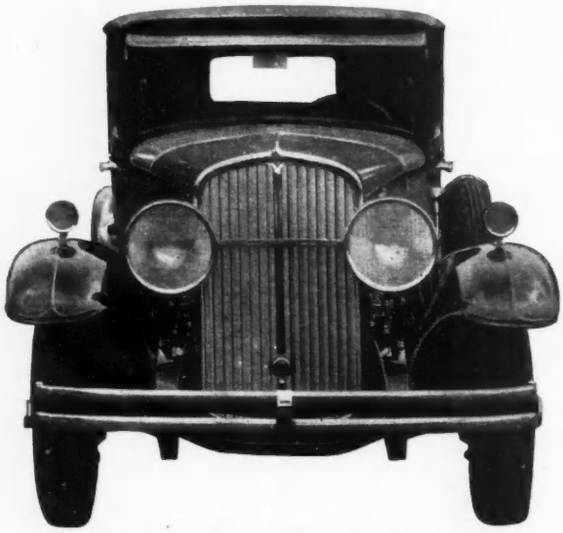
SOURCES of NEW AUTOMOBILE DEALERSHIPS in the United States

1928	1929	
36.0%	45.0%	Were organized by automobile salesmen, sales managers, etc., who were employed by other dealers.
22.0%	19.9%	Were organized by proprietors of garages or repair shops.
8.8%	5.3%	Were organized by former employees of automobile, parts and accessory manufacturers.
4.1%	2.9%	Were organized by men formerly employed in garages as mechanics or bookkeepers.
3.2%	2.3%	Were organized by accessory store proprietors.
2.9%	1.6%	Were organized by men formerly employed by automotive wholesale houses as salesmen or executives.
77.0%	77.0%	Of new dealers were formerly in automotive environment.
23.0%	23.0%	Of new dealers came into the automobile retail business from other fields.

Franklin for 1930 Has Side-Blast Which Develops *Power Equal* to

Next year's line to consist of two the small model having been and spark plug bosses

By P. M.



The front of the Franklin for 1930 has a changed aspect in that the shutters are not only an added feature, but are extended full depth of the hood

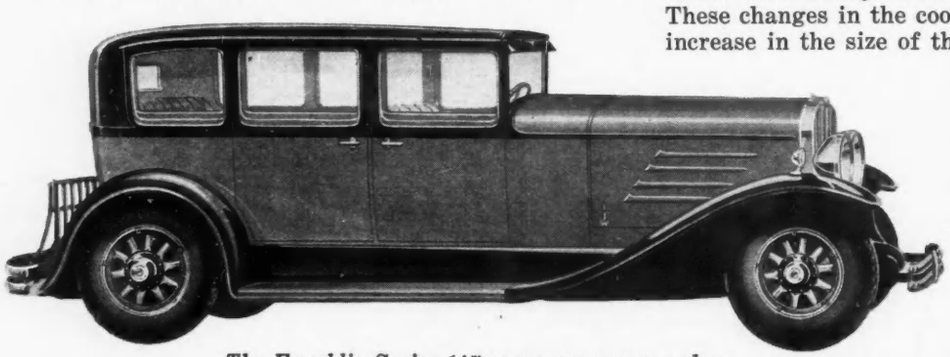
AN outstanding development in air-cooling of automobile engines is represented by the side blast type of engine which powers the new Franklin cars. Improvements have been made in the Franklin air-cooled engine practically every year, and a great many of these have had for their object an increase in the cooling capacity, which heretofore has been the controlling factor with respect to power output. In the past the induction system was restricted and the volumetric compression ratio kept at a moderate figure. The cylinders were provided with an integral head which contained the valve seats and spark plug boss, and which, since it had no cooling fins, presented only a comparatively small area to the cooling blast. By a new design of the cylinders and the cooling system these limitations have been completely removed, and the engine now develops fully as much power as a water-cooled engine of equal displacement. A horsepower curve of the new engine—a six-cylinder of 3½-in. bore by 4¾-in. stroke—is shown herewith.

The chief innovations in the engine are that the cylinder heads are now separate castings of aluminum alloy, and provided with large horizontal cooling fins; that the cylinders have similar horizontal cooling fins of cast metal, and that the cooling blast of air from the front-mounted blower is passed over the cylinders and heads horizontally instead of vertically as heretofore. These changes in the cooling system have permitted an increase in the size of the valves and of the inlet tract for the same cylinder dimensions, and an increase in the compression ratio to 5.3, the former increasing particularly the peaking speed, and the latter the mean effective pressure of the engine.

In 1930 the H. H. Franklin Mfg. Co. will produce two lines of cars, instead of the former three, the small mod-

FRANKLIN 1930 PRICES

	Price	Shipping Weight Lb.
Series 145—125 in. wheelbase		
Sedan	$2,485	3,930
Coupe	2,510	3,770
Club Sedan	2.575	3,890
De Luxe Sedan	2,585	3,940
Victoria Brougham	2,595	3,790
Convertible Coupe	2,610	3,790
Town Sedan	2,625	3,950
Pursuit	2,670	3,750
Series 147—132 in. wheelbase		
Five-passenger Salon Special	2,600	4,060
Seven-passenger Sedan	2,775	4,160
Roadster	2,785	3,810
Pirate Touring	2,785	4,050
Pirate Phaeton	2,870	4,120
Limousine	2,970	4,170
Sedan Limousine	3,050	4,180
Speedster	3,375	4,040
Custom Bodies		
Dietrich Convertible Speedster	3,625	
Dietrich Deauville Sedan	5,000	
Dietrich Town Car	5,100	
Derham Cabriolet	6,000	
Locke Convertible Sedan	7,500	

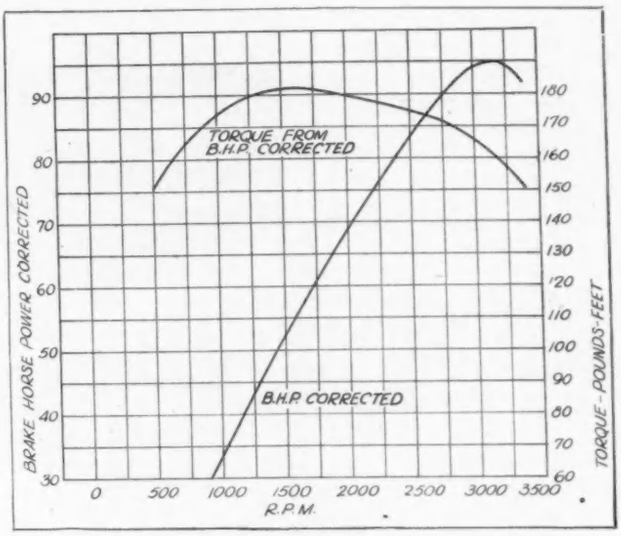


The Franklin Series 147 seven-passenger sedan

Air-Cooling *System* *Water-Cooled* Units

series, instead of the former three, discontinued. Cylinder head have cooling fins.

HELDT



Horsepower and torque curves of new Franklin engine

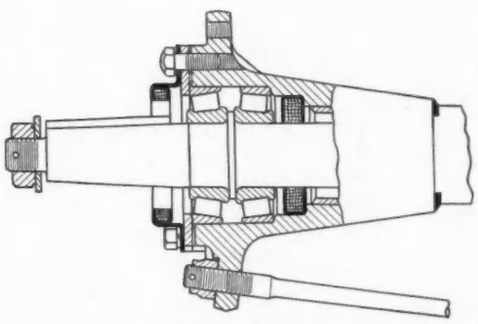
el having been discontinued. Both of the lines will be equipped with the same powerplant, and the chief differences will be in the length of wheelbase and in the bodies, which conform to the lengths of wheelbase.

The increased engine power has resulted not only in increased maximum car speed but also in materially improved acceleration, and the manufacturer furnishes the following comparison between last year's and the current model with respect to these two items:

Acceleration Speed Range m.p.h	Improved Series 135 Time in Sec.	Series 145 Time in Sec.
5-25	7.71	6.98
10-40	12.49	10.23
20-50	14.15	11.50
30-60	19.02	14.31
5-50	....	16.83
10-50	....	15.10
25-50	....	10.08
Actual Max. Speed	75.0 m.p.h.	80.0 m.p.h.

The detachable heads are of Y alloy, heat-treated, and have valve seats of aluminum bronze shrunk in and further secured by spinning the edges of the aluminum over them. A spark plug boss is screwed into the aluminum and locked against turning by pinning. Combustion chambers are completely machined.

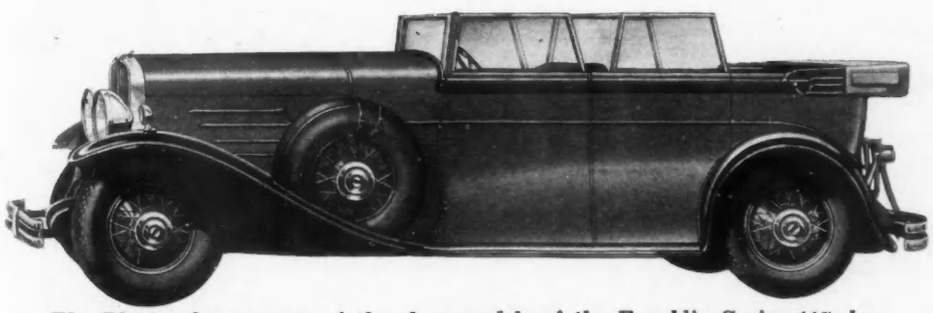
Cylinder barrels are cast of nickel-iron, with integral cooling flanges. Each cylinder head is secured to its cylinder by means of six bolts. A telescoping joint is used, and gas tightness is assured by the use of a plain copper gasket. The two valves in the cylinder head are arranged with their axes in a transverse instead of in a longitudinal plane, evidently to assure greater freedom of flow for the cooling air. Cylinder-head temperatures with the new construction are approximately 300 deg. lower than previously, which is due to the use of aluminum alloy with its higher heat conductivity, and to the provision of large cooling flanges. The hottest point is midway between valve seats, and thermo-couple measurements show that its temperature will not exceed 500 deg. Fahr.



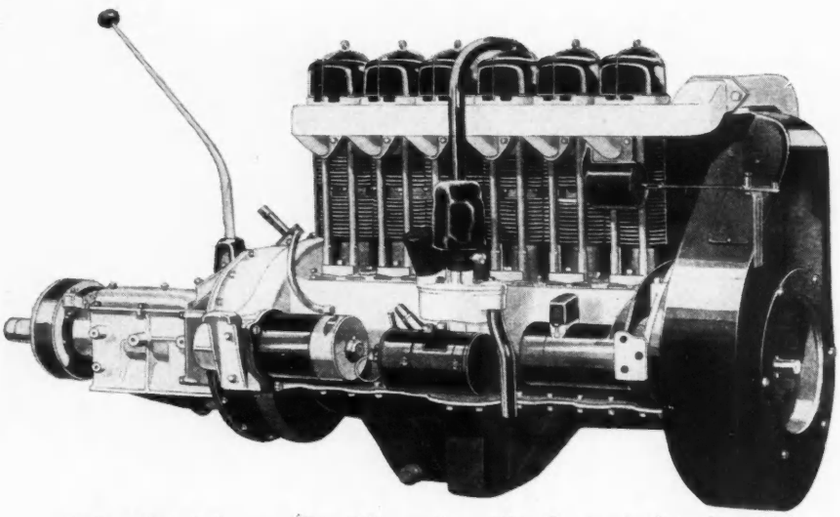
Double roller bearings are used in the rear axle ends of the Franklin

An interesting feature of the new head design is the means provided for reducing variation in valve clearance with engine temperature. The tappet levers are supported on a case which is secured in place by means of three studs, two of these passing entirely through the aluminum head, while the third is anchored in the head. This latter stud compensates for the increase in valve clearance with increase in engine load due to the greater heating and axial expansion of the cylinder as compared with the valve tappet rods. The clearance is set at 0.007 in. with the engine cold. The valve tappet levers are lubricated with oil supplied by an inertia pump through felt wicks, the same as last year. As a result of the lower cylinder head temperatures the life of valve seats has been increased materially. The contours of the inlet cams have been altered to assure better idling and better low speed performance.

With a bore and stroke of 3½ by 4¾ in. and a displacement of 274 cu. in. the engine develops a maximum of 95 hp. at 3100 r.p.m., while last year only 67 hp. was obtained from an en-



The Pirate phaeton, one of the show models of the Franklin Series 147, has unusual body treatment in that the doors are extended to the step



Right side of the new Franklin engine. The thermostatic unit, which controls the radiator shutters, is located on the side of the front cylinder, where it is exposed to the current of air after the air passes between and around the cylinders. Cooling fins have been extended to cover the head and valves

gine of the same dimensions at a materially lower speed. The compression ratio has been raised from 4.68 to 5.3, and the maximum compression pressure from 87.5 at 1500 r.p.m. to 106.5 lb. p. sq. in. at 1800 r.p.m. Notwithstanding the great increase in power, it has been found possible to achieve adequate cooling with a smaller fan—12 in. instead of 14 in.

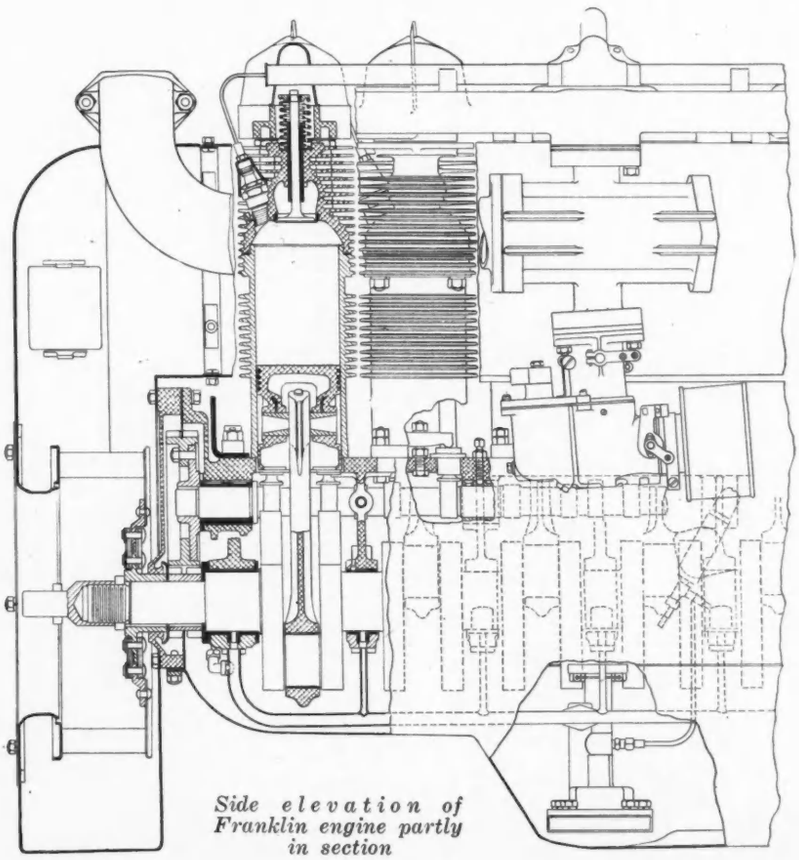
The increase in the brake horsepower of the engine is due in part to a reduction in the power required to operate the blower. The 14-in. fan used last year at 3000 r.p.m. delivered 67 cu. ft. of air per second against a pressure of 10 in. of water column and absorbed 15.75 hp., while the 12-in. fan of the new model at the same speed delivers 62.5 cu. ft. of air per second against a pressure of only 3.5 in. of water column and absorbs 8 hp. Thus, while the rate of air delivery has been reduced about 6.7 per cent, the power consumption has been reduced nearly 50 per cent. How it is possible to properly cool the new engine of greatly increased output with a reduced air current will be explained later on.

Naturally, with the larger valves, larger carburetor, etc., the pumping losses are reduced for any given speed, and the better cooling of the heads prevents incipient detonation at the higher speeds, and the loss of power resulting therefrom. The increase in the maximum brake horsepower of the engine is, of course, partly accounted for by reductions of these various losses.

The complete cooling system consists of the fan or blower, its housing, the cylinder air housing, cylinder barrel and cylinder head with their cooling flanges. The fan housing is given such a form that it conducts the air from the fan into the cylinder housing without generating appreciable eddies, while the cylinder air housing is so shaped that cooling air is delivered to the various cylinders in such proportion that all are maintained at substantially the same temperature. In the previous model the cylinder fins were depended upon to a large extent to carry off the heat absorbed by the head in addition to that absorbed by the cylinder walls, while in the new design they have to dispose only of the latter heat, and whereas in the old engine all of the cooling air passed over the cylinder fins, only 28 per cent passes over them now, the remainder passing over the cylinder head flanges.

The inlet system in general is similar to that on the previous model, but a 1½-in. carburetor (Stromberg) is fitted, instead of a 1¼-in. This draws air through an AC air cleaner and delivers charge through a gasoline vaporizer to a Swan-type manifold. The vaporizer gas passage has been enlarged and its heating surface has been increased so that it will maintain about the same charge temperature as previously (115 deg. Fahr. under full throttle and 135 deg. Fahr. under part throttle), in spite of the increased rate of flow. The increased compression ratio and the decrease in fan load result in an increase in fuel economy, and a mileage of 17 to the gallon at 20 m.p.h. is claimed for the 145 sedan.

The engine lubrication system is now conventional, in that the distributor through which the pump formerly fed the different bearings in turn, has been dispensed with, and the pump now delivers oil to all of the main bearings through a header. The pressure on the oil is limited to 50 lb. p. sq. in. by a relief valve, and is indicated by a pressure gage on the instrument board. A lead from the pressure relief valve carries oil to the



Side elevation of Franklin engine partly in section

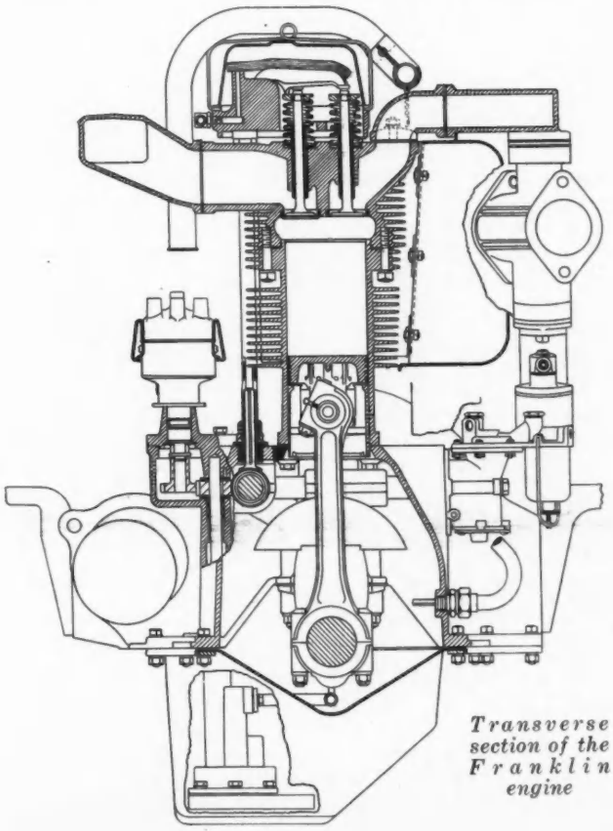
purifier through a restricted (No. 60) 1 drill hole.

The pistons remain of the Nelson-Bohnalite type, practically unchanged, but the width of the oil-control ring has been increased from ⅛ to 3/16-in. Perfect Circle rings are used in all grooves. Duralumin connecting rods with spun-in babbitt linings at the big end are continued, but have been strengthened materially in view of the higher explosion pressures.

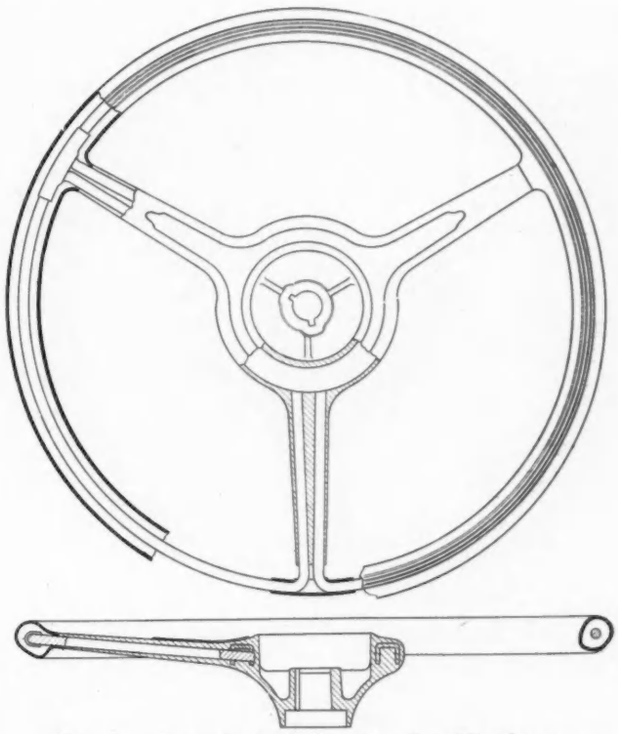
Delco-Remy electrical equipment is continued with only few changes. The ignition distributor advance curve has been changed to less rapid and less maximum advance, as required by the increased compression. Whereas the maximum advance formerly was 1⅝ in., it is now only ⅞ in. The coil winding has been changed to give more positive ignition at low speeds, and the generator now is provided with a thermostatic control device which decreases the charging rate by 7 amp. at a certain generator temperature, which is generally attained after about 10 miles of driving on the open road. The starter remains unchanged, as does the U.S.L. 19-plate battery.

An option is given on either a three-speed transmission with silent intermediate, or a four-speed transmission with silent third, without additional cost, on all 145 models except the Pursuit model and on all 147 closed models except the speedster. All other models will be fitted with a four-speed transmission with silent third exclusively. The three-speed transmission used is the Warner, and the four-speed is the Detroit.

Speed ratios in the three-speed transmission are 3.12, 1.42 and 1 to 1, and in the four-speed, 3.494, 1.993, 1.278 and 1 to 1. Propeller shafts are tubular and contain two Spicer metal universal joints. There has been very little change in the rear axle, which is of the semi-floating type with an aluminum center housing and alloy steel axle tubes. At the outer ends double reversed Timken bearings are now used, instead of single bearings, so that end thrust in both directions is taken up directly at that wheel where it originates.



Transverse section of the Franklin engine



The steering wheel of the new Franklin has a reenforced die-cast aluminum spider and a molded Bakelite rim

Rear axle ratios are as follows: All models of the 145 line with the exception of the sport-touring, together with the 147 series five-passenger sedan, 4.54 to 1; series 147 closed models except speedster and five-passenger sedan, 4.73 to 1; series 145 sport-touring and series 147 speedster and open models, 4.25 to 1.

Brake assemblies at the wheel are continued unchanged, four-wheel internal hydraulic service brakes being fitted, with drums 14 in. in diameter and linings 1¾ in. wide. The master cylinder is mounted on the left of the transmission, its piston being connected directly to the brake pedal without intermediate linkage. A very substantial mounting has been provided for the master cylinder, resulting in a firm-feeling pedal and a higher degree of safety. The fluid supply tank is arranged in a convenient position on the forward side of the dash, and compensation of the system is automatic.

The steering gear is a Gemmer cam-and-roller type with a reduction ratio of 18 to 1. An improved type of three-spoke steering wheel is provided. It is made up of a die-cast aluminum hub and spokes, reenforced with two 5/16-in. steel rods that pass completely around the rim and are anchored in a channel-shaped reenforcement which in turn is anchored in the hub. The rim is molded of black Bakelite.

All plates of the full-elliptic springs are now of alloy steel, and the rear springs in addition have been lengthened 4 in. and made considerably softer. Shock absorber equipment has been entirely redesigned, and the cylinder diameters have been increased from 1¼ to 1½ in. The double-acting piston is now made in one piece and the control valves are built into the piston, instead of in the housing. The impact valve is now of the spring-compensated type, automatically varying the valve opening to compensate for hot and cold weather operation. This valve is adjustable through an opening at the end of the housing. The impact valve is now independent of the recoil valve and is non-adjustable. An improved oil seal is provided at the rocker shaft bearing.

Graham-Paige 1930 Line Includes With *Four-Speed* Trans

Larger engine, developing 100 hp., is added to series to be exhibited at the National Automobile Show in New York next week.

By ATHEL F. DENHAM

The front end of the new Graham Eight, showing the peaked radiator front with built-in shutters

SIX chassis models are being offered for 1930 by the Graham-Paige Motors Corp., two sixes and four eights, at the National show in New York next week. Two of the eights, both with 122 in. wheelbase, are new. One of these, the Standard Eight, has a three-speed, the other, the Special Eight, a four-speed transmission. The other four include two sixes of 115 in. wheelbase, the Standard Six with a three-speed and the Special Six with a four-speed transmission, and two larger eights, now called custom eights, on 127-in. and 137-in. wheelbase chassis. These four models, formerly known as Models 112, 115, 127 and 137, have been refined with respect to both bodies and mechanism.

A feature of the Graham Standard eight is the new transmission, which has helical spur gears for the constant mesh and second speed sets. Second speeds also are in constant mesh, change of gear being effected by means of a dog clutch on the splined main shaft located between the constant mesh and second speed gear sets. These two sets of (constant mesh) gears have helical teeth of opposite hand (direction) so that the thrusts on the countershaft due to the two pairs of gears are opposed and tend to balance out. To take any excess end thrust, bronze washers are provided at the ends of the countershaft gear cluster.

Four-door sedan on the new Graham eight-cylinder chassis

Since the second speed gaer on the main shaft, unless engaged by the dog clutch, rotates freely on the main shaft, the splines on the latter are cut away to provide full cylindrical bearing surfaces. However, the splines are allowed to extend some distance inside the gear, to draw oil in and provide the necessary lubrication for this bearing surface.

The new 122-in. wheelbase eights are naturally of greatest news interest. Features which add to the external attractiveness include door-type hood ventilators instead of louvers, fender-type parking lights, chrome-plated cowl bands, more rounded body rear panels, a new radiator shell, peaked forward at the top center, with headlamp rims to match. Safety glass is standard for all windows in all models.

Inside the bodies are found such features as adjustable front seats, and two-position rear seats, two quarter pockets in the cowl, inside visors on the three-speed model with glass external visors on the four-speed; front compartment rubber floor mats molded directly to the floor boards, with the rubber extending around the board edges to prevent squeaks and rattles; a one piece toe board, made possible by passing the steering column through the dash; a new instrument panel with pressed-on wood facing on the four-speed model; compartments in the back of sedan cross seats, containing also a note book, mirror and pocket; pillow-type seats, with two sets of coil springs, one above the other and piped mohair upholstery; automatic dome light switches, operating with the doors; wind cord around both sides and top of doors to eliminate drafts, and hassocks instead of foot rails.

Body construction has also been materially improved. Where formerly wood screws were normally used, these have been largely replaced by bolts, the latter being so placed, moreover, that they can be tightened easily by merely turning back the interior body lining. There are now two rear belt rails instead of the customary single one; other body rails are heavier; better bracing is also used at the pillars.

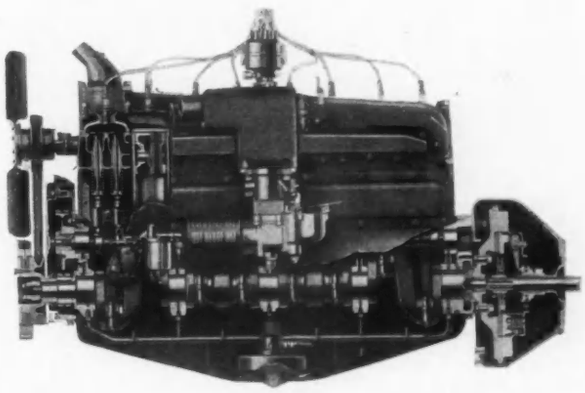
Mechanically, the new 122 in. wheelbase eights are powered with a 100 hp. 3¼ by 4½ in. 298.6 cu. in. engine, rubber mounted at the rear. Its five-bearing crankshaft has 2⅝ in. main and 2¼ in. crankpin bearing diameters. A Lanchester damper is fitted.

Cylinder blocks are horizontally ribbed at

Four *Eights and Two Sixes* mission in *Two Models*

THE GRAHAM

WITH the announcement of its 1930 models at the National Automobile Show in New York, all passenger cars manufactured by the Graham - Paige Motors Corp. will be called only GRAHAM hereafter. The other half of the Graham-Paige name will be represented during the next month by the addition of a line of PAIGE commercial cars.



Partial section of the new Graham eight-cylinder engine used on the 122-in. wheelbase chassis

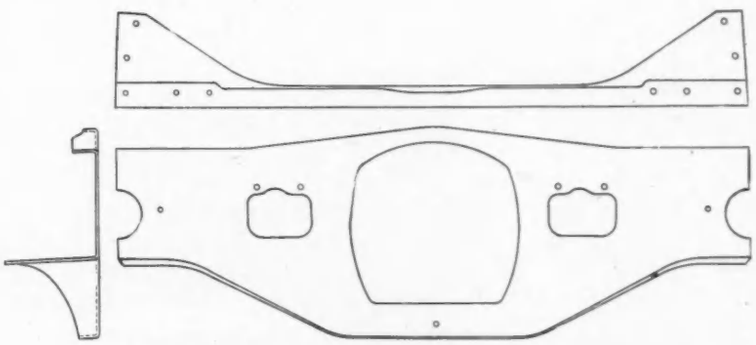
their lower sides for crankcase stiffness, and cylinder barrels are supported only at the top and bottom so as to be completely water-jacketed. Of unusual interest also is the manifolding, which differs considerably from conventional designs. In the first place, the ports, instead of being round, are rectangular in shape, with the bottoms of the rectangles approximately at the center line of the usual circular port. This decreases the height of gas lift into the combustion chamber, thereby reducing tendency to load up.

It was found by experimentation that the best operating conditions are obtained not with corners in the manifold reduced to a minimum, but with the turns from the manifold header to the ports comparatively sharp, so that the gas flow is almost reversed. The more favorable results obtained are probably due to the higher turbulence and resultant better mixing of the air and gasoline. The manifold itself is of the dual type, with a single venturi carburetor and single riser, heat jacketed.

The heat-jacket and the heat control also embody features of interest. In the heat-on position, exhaust gases from all the cylinders pass around the riser, which necessitates the use of a large heat-control valve. The latter has a 90 deg. motion. In one position it completely seals the normal exhaust outlet, while in the other it shuts off the riser jacket branch. To prevent "freezing up," it is mounted in two split bronze cone bushings, spring loaded. Valve control is from the dash. The valve housing box is assembled on the manifolding in such a manner that the exhaust manifold flange is at right angles to the inlet manifold flange. This design, together with the bole clearance provided, simplifies assembly and adjustment. The entire design is such that with the heat control in the "off" position very little heat is transmitted to the inlet riser.

A carburetor of the expanding-throat type, manufactured by the Detroit Lubricator Co., is fitted. As the throat vanes open automatically at increased speeds or on sudden throttle valve opening, they lift the central metering orifice further off the metering pin and increase the amount of fuel discharge automatically. An accelerating pump and economizer is built into this unit, which only has one adjustment, that of the metering pin, which regulates the air-fuel ratio for all speeds.

To help in vaporizing the fuel during the warming-up period, an additional spring load is applied to the expanding vanes by a connection to the choke lever. This keeps the vanes more nearly closed, thus increasing the air velocity at the metering orifice and improving atomization of the fuel. Throttle and choke valves are interconnected in such a manner as to "crack" the



Drawing illustrating the manner in which a frame cross-member has been built into the Graham between the transmission and the engine

throttle slightly in starting, to prevent overchoking.

Other engine features include a self-lubricating fan, with an oil reservoir, and a grounded conduit to carry all the wires entering the driver's compartment, including high tension leads to the coils, instrument wires, etc. The dash heat indicator is thermo-couple operated. Thermostatic radiator shutters are standard equipment on the four-speed model.

Of special interest in the chasis are the new spring shackles. These have rubber balls pressed into steel cups, with the shackle pins passing through them, the entire assembly being clamped lengthwise of the shackle bolt so that the rubber balls are firmly seated in the cups and grip the bolt. The endwise clamping also reduces the side-sway sometimes experienced with rubber shackles. Motion of the spring in this design is of course absorbed by distortion of the rubber. This construction is used at all spring ends of the new eight. Its adoption naturally simplifies the chassis lubrication problem. Other features adopted with the same end in view are oil-type universals, and the grouping of three alemite connections under the hood for lubrication of the clutch throwout bearing, and the clutch and brake pedal shafts.

The frame has a new banjo-type cross-member which passes around the transmission case. This is normally one of the weakest points of the frame, especially with rubber engine mounting. To make possible the positioning of an additional cross-member there, and thus strengthen the frame, it was necessary to change the entire method of car assembly, so that engines and transmissions are assembled separately into the chassis, rather than as a unit, because the gearshift lever is to the rear of the new cross-member. Double-acting Lovejoy shock absorbers are standard equipment.

Refinements in the three and four-speed sixes are found in largest numbers in the bodies. These have a more rounded rear panel. The structural features described in connection with the new eight are found in these models also. There is an inside visor on the three-speed six, and a glass visor on the four-speed model, while the new one-piece toe boards with bonded rubber mats are found on all models. All models now also have French roofs, with metal side panels.

In the six-cylinder chassis the rubber-type shackle described in connection with the new eight is used at the forward end of the left front spring, and is expected to materially reduce any tendency to wheel fight and shimmy.

All of the four continued models will have the new frontal dress, including the new radiator outline with central peak, and lamps to match. The chrome-plated cowl bands, which are standard on all models, are quickly replaceable if necessary, being snapped over retainers that are spot-welded to the cowl.

Following is a list of body models offered on the different chassis:

Three-speed six: Four-door sedan, rumble-seat coupe, business coupe, cabriolet roadster and touring.

Four-speed six: Four-door sedan and rumble-seat coupe.

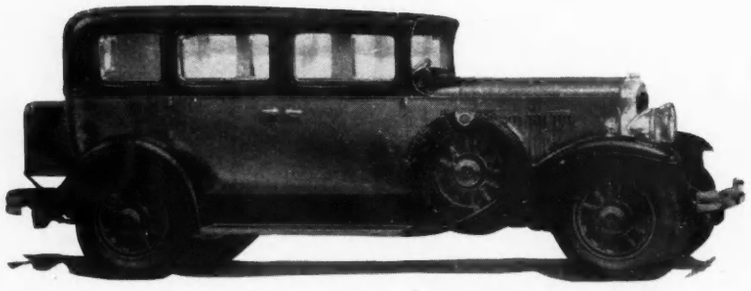
Three-speed eight, 122-in. wheelbase: Four-door sedan and rumble-seat coupe.

Four-speed eight, 122-in. wheelbase: Four-door sedan, rumble-seat coupe, and in addition a seven-passenger sedan on a 134-in. wheelbase chassis.

The other chassis models will be turned out with substantially the same line of bodies as in the past.

New Flying Cloud Has "Tower" Clutch

TWO new Flying Clouds, Models 20 and 25, are being announced by the Reo Motor Car Co., to replace the Model C. Model 20 has a wheelbase of 120 in. (as compared with 121 in. for Model C), and will sell at a somewhat lower price. It has the improved Flying Cloud engine, a Russell "Tower" clutch, a spur-gear transmission, 6.00/18 tires, and a rear axle ratio of 4.07 to 1.



Reo sport sedan, on Model 25 chassis, to be exhibited at the New York Show

Model 25, with a wheelbase 4 in. longer (124 in.), has the same engine, a Long clutch, the recently announced herringbone "quiet-second" transmission, 6.50/18 tires, and the same rear-axle ratio of 4.07 to 1.

Base prices on the three Reo lines will be as follows:

Model 15, $1,195	Model 20, $1,595
Model 25, $1,795	Model 25, sports, up to $1,945

Other changes made in the chassis of Models 20 and 25 include a larger fuel tank (20 gal.), a three-spoke steering wheel with two control levers, new fenders, and a deeper radiator. Chrome-nickel cast-iron cylinder blocks and "Lo-ex" aluminum-alloy pistons are continued, the major change in the engine being the elimination of all oil pipes, oil now being carried through passages drilled in the block, which eliminates the possibility of trouble due to pipe breakage.

The new Russell "Tower" clutch, used on the Reo 20 for the first time, does not differ in principle from the unit formerly used. In place of the coil spring drive between clutch plate and hub, however, this unit has radially laminated springs arranged in a five-point star about the hub, and assembled with sufficient clearance at the outer end to permit slight relative motion of the clutch hub and plate under varying loads, the springs finally damping the relative motion through interleaf friction. There are 12 laminations in each of the five spring assemblies.

On Model 25, the Long clutch, with its vibration-damping spring cushion drive, is continued. This model has four cowl ventilators, two on top and two at the side, while Model 20 has only the two top ventilators. Further new features of Model 25 include adjustable front seats, mono-control windshields, concealed wiper mounting, and 10-spoke wood wheels, with demountable wire or wood wheels optional.

American Exhibits Predominant at Brussels *Show*

Thirty-eight makes of passenger cars constitute a record for exhibits of United States manufacture in Belgium. Belgian sales were satisfactory this year.

By W. F. BRADLEY

(Special dispatch to Automotive Industries)

THIRTY-EIGHT makes of American passenger cars constitute a record in the twenty-third annual Brussels automobile show, which was opened in the Palais du Cinquentenaire by Bourgomaster Max. France comes second with 22 firms, Belgium has 8 makes, Italy and England 4 each, and German and Austrian makers 5. In the truck section there were 13 American makes, 10 French, 10 Belgian, 3 Italian, 4 German and one English. The rented area of stands was 377,000 sq. ft.

Sales have been satisfactory on the Belgian market during the past year, a total of 25,000 being reached. At the present time there is a strong fear that American competition may become more acute and that, in view of reduced output and possible accumulation of stocks, dumping may be resorted to.

The Belgian passenger car business is now practically limited to three firms or groups, these being Minerva, with a factory at Antwerp; F. N., located at Herstal, and Imperia-Nagant-Excelsior. In this last mentioned group Imperia is the most active; the Nagant factory has been almost entirely converted back to its original business of manufacturing small arms, and Excelsior is on a very limited production of a high-grade six-cylinder model. Having connections with Voisin in France, it is possible that Excelsior will at some future date produce a car with the Voisin sleeve valve engine.

The Chrysler assembly plant at Antwerp has been closed down, the machinery and equipment is being offered for sale and in future cars will be imported complete. S. D. Briggs, European manager for Chrysler, is at present at Detroit. The Hudson-Essex Co. is just about ready to open its assembly plant in Brussels. This has been delayed owing to legal difficulties in getting the free port facilities enjoyed by General Motors and Ford, at Antwerp and Hoboken, extended to this particular suburb of Brussels.

New models at the Belgian show were limited to a 244 cu. in. straight-eight Minerva and an 88 cu. in. F. N., which will be produced in a new factory nearing completion. The Sizaire Freres car, with independently sprung wheels, which was taken off the French market a few months ago, is about to be manufactured in Belgium by Georges Sizaire, an American engine and transmission being used. A new front-wheel drive known as the Astra, having a 62-cu. in., four-cylinder engine, has been produced by a firm at Herstal.

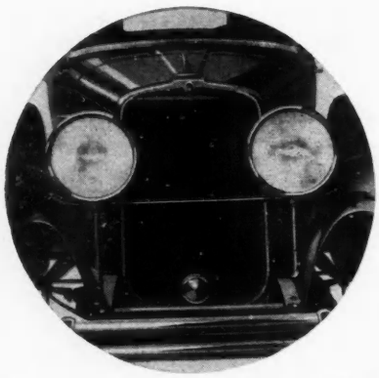
The Minerva straight eight is of the same general design as the firm's bigger model presented for the first time at the Paris show. Cylinder dimensions are 2.95 by 4.4 in. It has a nine-bearing shaft, a double oil pump, one pump delivering oil at high pressure to all the bearings and the other circulating it through a radiator and a filter; battery ignition; mechanical gasoline pump, a four-speed transmission with a silent third, open driveshaft with two metal universals, Ross steering gear and Bendix four-wheel brakes with a Dewandre servo.

One of the novelties in the body section was the use of compressed cork panels in place of metal. It is claimed that they are free from resonance, warm in winter and cool in summer, and have the advantage of saving about 130 lb. weight on an average body.

In the truck section Minerva had two new six-cylinder sleeve-valve bus chassis. Dass has produced a straight eight bus chassis with Lycoming engine, and Miese is entirely on straight eights for both bus and coach chassis. For the first time American representation was strong in the truck section, while Germany is also showing activity with Bussing, Mercedes-Benz, N.A.G. and Opel.

The main floor of the Palais du Cinquentenaire, where the twenty-third annual automobile show of Brussels was held

Peerless Will Introduce Two New With a Third *to be Offered*



The new Peerless Eight has fender parking lights, thermostatic shutters and new radiator outline

Master and Custom models now in produc for public demonstration. Price recently, varies from below

THREE new eights represent the offering of the new management of the Peerless Motor Car Co. for 1930. Of these, the two larger, the Master Eight, designed for the under-$2,000, and Custom Eight, for the under-$3,000 price class, are already in production. The Standard Eight, to be priced at $1,200 to $1,500, while being announced to the trade, will not be offered to the public until later in the spring. The six-cylinder Model 61-A, recently introduced at below $1,000, is also available.

The new eights have such features as four-speed internal-gear transmissions in the two larger models, rubber shackles and cable-operated Bendix two-shoe brakes, non-shatter glass in the windows of all models, but the chief claims made for them are consistency in engineering and individuality in body designs.

In the Master Eight sedan molding is applied at the base of the body panels in the form of cheat lines. These moldings follow on around the rear fenders, becoming convex at the base of the rear body panel, thus fairing the back of the body into the metal valance over the rear end of the chassis and fuel tank. Below the belt molding there is a slightly concave depression giving the appearance of greater length.

On the other hand, the cheat molding at the base of the body side panels is curved, with the lowest point in the center. The belt molding is wide on the body side panels and narrow on the hood and across the back. Roof side panels have an unusually large amount of taper in depth toward the front, adding to the appearance of low height. The vertical louvers are set in a panel and segregated into groups. There are two ventilators on top of the cowl and built-in thermostatic shutters on the radiator. Parking lights are mounted on the fenders. Hood hinges are of the double type, chrome-plated.

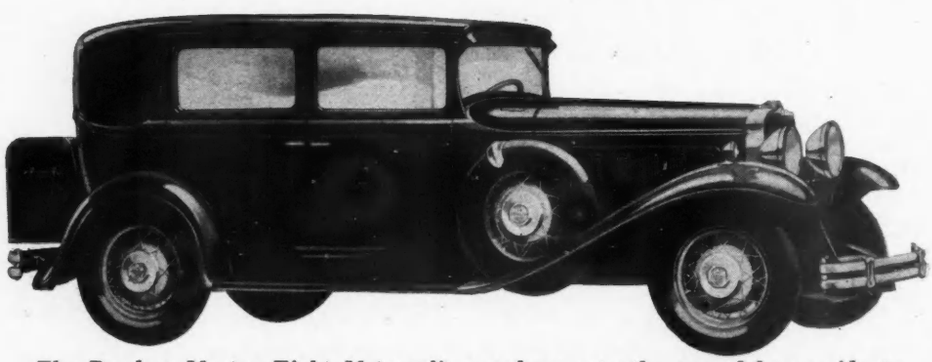
Adjustable seats and smoking sets built into the back of the front cross-seats, with a tasseled robe cord on either side, are among the items of body equipment. Garnish moldings are given a distinctive appearance by the use of an upward curve in their lower edge. In the rear compartments are found center as well a side arm rests.

Starter, horn and light controls are combined in a single button at the center of the steering wheel. Windshields are of the sloping type, with crank-operated swinging control. In addition to the usual instruments a dash heat indicator, a gasoline gage and a clock are mounted on the instrument board.

On the Custom Eight sedan are found such additional features as wood paneling around the rear window, pockets in rear compartment arm rests, two dome lights, a control over the left front door to enable the driver to raise or lower the rear window curtain, two smoking sets in the front compartment, interior sun visors and tandem wipers. As regards body features that show on the outside, instead of hood louvers, door ventilators are used, car doors are curved at the bottom, windows at the top. Running boards are of steel with vulcanized rubber mats and bright moldings; courtesy lights are standard. A trunk rack is mounted at the rear, as is a combination backing, stop and tail light.

On both models fender-well mounting of spares is standard practice, even with artillery-type wheels. Spare tires or wheels are supported mainly by a tubular member which passes completely through the cowl and is supported from the dash.

As already mentioned, these two models have four-speed transmissions, which are in unit with the 3⅜ by 4½ in. Peerless-designed, Continental-built engine. This engine is similar to that used in Peerless Model 125, but it has a new combustion chamber outline and



The Peerless Master Eight Metropolitan sedan; note the curved lower side to the body panels. The wire wheels are extra, but fender well mounting is standard

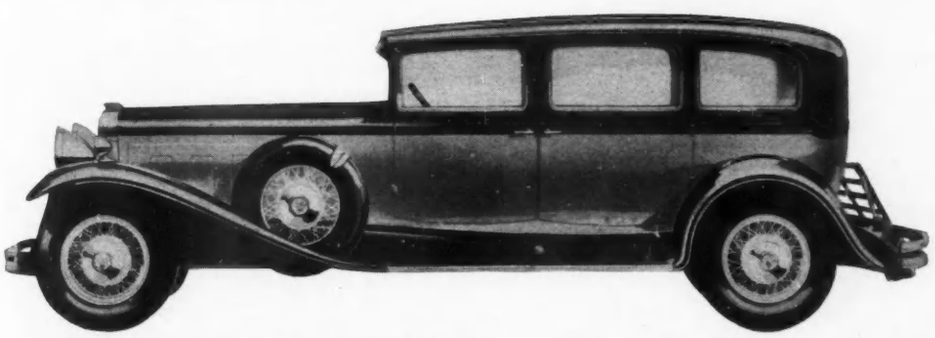
Eights at the New York Show Later *in the Spring*

tion, with the Standard not yet prepared range, including the 61-A series $1,000 up to under $3,000.

a new type of automatically lubricated fan with vane-type impeller. The generator is now driven through the fan belt, and the chain drive has been reduced to a two-point type. The water pump is driven through the generator shaft. At the rear the engine is supported by rubber mountings on the frame side rails, while at the front it is bolted down rigidly at two points.

The combustion chamber is quite unusual in shape. It is domed and reaches its maximum height on the side of the spark plug away from the valves. The chamber is of the offset type, and there is a circular depression cut in the head in the low clearance space in cylinders Nos. 2 and 7 to offset the loss in volume due to the presence of locating bosses in the combustion chambers of these cylinders for accurate head machining. It is understood that the same type head will also be used on the Standard Eight engine, the latter having a bore and stroke of 2⅞ by 4¾ in.

On the Custom Eight a duplex 1¼-in. carburetor is used, and on the Master Eight a single 1½-in. Instead of the customary piston-type valve, the Master Eight carburetor has a hinged flap valve, spring-loaded, at the air intake. The latter is rectangular, and the air cleaner outlet is of corresponding shape. Fuel feed is by an AC pump.



Peerless Custom Eight sedan, showing the curved lower door edges, hood ventilator doors in place of louvers, etc. Note the cowl treatment at the base of the windshield

These engines, it will be remembered, have five-bearing, 2⅝-in. crankshafts, Nelson Bohnalite four-ring pistons, a Lanchester damper, 30-deg. seat inlet valve and pressure lubrication to main, connecting rod lower and camshaft bearings.

Electrical units are now of Auto-Lite manufacture, comprising a single-breaker distributor, Bendix starter engagement and a third-brush generator.

Between the hub and the driven plate of the Rockford clutch there is a rubber insert. These clutches have facings of 10¾ in. outside and 6¾ in. inside diameter, the lining being 5/32 in. thick.

Bendix two-shoe brakes, cable-operated are standard equipment on both the Peerless Master Eight and Custom Eight

Gear ratios in the Warner Gear four-speed transmission are 4.010 to 1 in first, 2.461 to 1 in second, 1.424 to 1 in third, and 3.462 to 1 in reverse. The low-speed position is where the reverse is usually located, engagement of the reverse being effected by shifting the lever to the left and forward from that position. To prevent accidental engagement of the reverse when it is desired to engage the low speed, a thumb trigger is provided on the shift lever, which must be pulled up before the gear can be shifted into reverse.

Spicer universal joints are used, and rear axles of Salisbury make. The latter are semi-floating and have a 4.45 to 1 reduction. Brakes are of the two-shoe Bendix type, cable-operated, with single cross-shaft, the latter having a steadyrest in the center, supported from the frame cross-member to the rear of the shaft. Brake pedals are large and designed to give a large area of contact with the foot, and consequent low unit pressure. Cross-shaft ends are carried in pressed-steel cups mounted between frame side members and a ⅛-in. steel plate. Emergency brakes operate on all four wheels.

The steering gear is of the cam-and-lever type.

Spring shackles are of the "chimney" type, of rubber, as previously mentioned. Full tanks also are rubber-mounted at three points, and of 24-gal. capacity.

Wahl two-way hydraulic shock absorbers are standard equipment. All cars are wired for radio installation. Tires are 6.50/19 in. on the Custom Eight and 6.00/19 in. on the Master Eight. Optional gear ratios of 4.71 on the Master Eight and 4.81 on the Custom Eight are available.

Geared Engines for Airplanes

While progress has been made since as the earliest form of drive on of development, with high

By Edmund

THE use of reduction gearing between engine and propeller is as old as the power-driven airplane, and therefore the geared engine antedates the direct-drive types which appeared in subsequent years, and which are used in most current designs.

That the geared propeller is the earliest form of drive is indicated by the fact that chains and sprockets were used in driving the two propellers utilized by the Wright brothers in their memorable first power flight of Dec. 17, 1903. In this installation, in order to have the propellers run in opposite directions, one of the chains was crossed. Both of them were carried in tubes, presumably to steady them against whipping, since the distance between the engine and propeller centers was several feet. In later developments of the Wright plane a similar form of reduction drive was used.

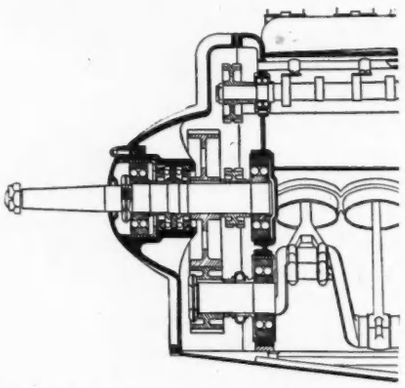


Fig. 2—Gear reduction of engine designed by Raymond M. Howard of Detroit, in which liberal use was made of ball bearings

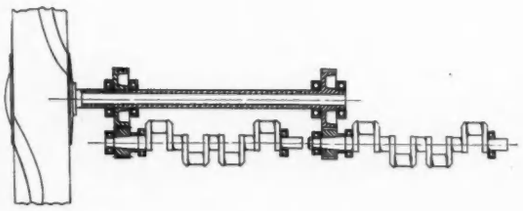


Fig. 3—Layout of crankshafts (right), two tandem-mounted Hispano engines with gear drive to a single propeller shaft

It should be kept in mind that the reason for utilizing a reduction gear in this first plane was in part that which applies at the present time, namely, the advantage of increased propeller efficiency through slower rotating speeds, although the state of propeller design at that time demanded a much slower speed than was later found necessary.

From about 1908 or 1909 up to the beginning of the World War (1914) both plane and engine design progressed rapidly, though possibly more attention was paid to the plane than to the engine.

Owing to the fact that in 1914 the rotary engine was considerably lighter, in lb. per hp. overall weight, than any of the other existing types, with one or two exceptions, it predominated in allied machines at the start of hostilities. The war-time demand for increased horsepower, combined with the difficulties experienced with rotary engines, brought both radial and water-cooled Vee types into prominence, the latter again calling attention to the possible advantages of a gear reduction between engine and propeller.

During the war period apparently the development of geared engines was largely through the efforts of French and other designers on the side of the Allies, whereas the Germans concentrated their efforts on the development of direct-drive, water-cooled, in-line types similar to the Mercedes. England contributed the Sunbeam and other geared engines prior to the end of 1916.**

So far as available records show, there were no geared engines developed and placed in service by Germany during the war. At the end of the war, interest in the development of geared engines may be indicated by

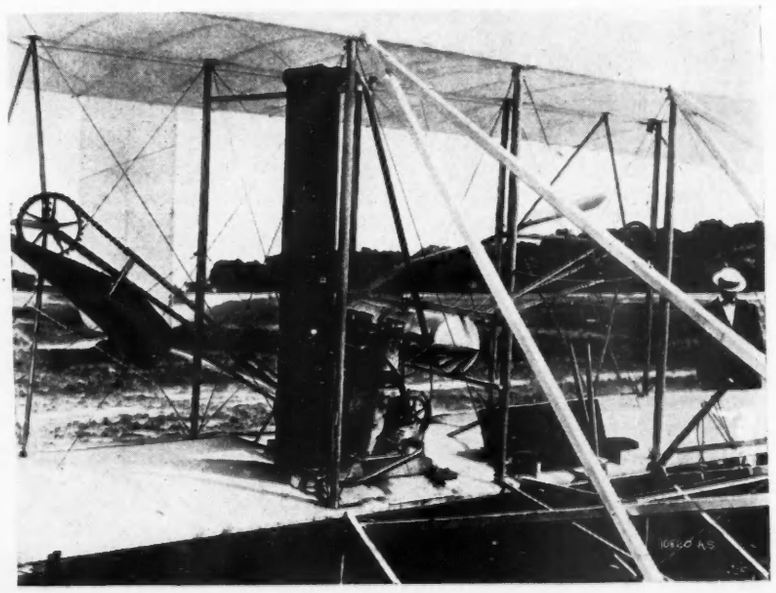


Fig. 1 (below)—Showing the propeller-shaft drive by chains on the Wright Brothers 1909 model

** See A.S.M.E. Journal, November, 1916, abstract of report of meeting of Executive Committee, N.A.C.A., June 8, 1916.

Antedate *Direct-Drive* Types

the first geared propeller was used the first Wright plane in 1903, goal speed plant, is not attained.

B. Neil*

the fact that on Dec. 26, 1918, orders were placed by the U. S. Government for one Duesenberg 16-cylinder geared engine and for several epicyclic reduction gears, the latter for three Liberty 12-cylinder engines specially designed for use with this type gearing. Later orders were placed for additional sets of gears for these engines.

Just as the war stimulated airplane engine development, it was also responsible for the development of the various forms of reducing gears which are now on the market both in the United States and abroad. In France many types of geared engines appeared between 1914 and 1918, the best known of which were the Hispano-Suiza and Renault. In England there was the RAE 1-B.

The Hispano geared engines, and also some of the others, I believe, while they may have been considered successful according to the performance standards of the day, they were not wholly satisfactory. The fact that the Hispano was made the leading engine of the French Army in much less than six months from the time the design was completed is ample evidence of the complete soundness of the design as a whole, and the direct-drive type in particular, but Marc Birkigt, the designer, in 1918, said that when flights at high altitudes became common the call was for more power. This necessitated increased engine speed and gearing down the propeller. This was done, allowing 220 hp. to be obtained from an engine originally designed to produce 150 hp. The engine was never as reliable as the original one with the direct propeller.

All reducing mechanisms seem to have been of one of the following four types:

(a) Spur or helical gears.
(b) Epicyclic or planetary gears.
(c) Propeller driven from camshaft.
(d) Cam and link motion.

Spur gearing was used on the Hispano, Duesenberg, King-Bugatti, King, and a number of other engines. Epicyclic gearing seems to have been first used by Farman working in conjunction with Waseige, this latter type having been adopted more recently by Pratt & Whitney with the Hornet geared engine, and by Allison with its VG 1410 engine. At present the Waseige - Farman reducing gear is used on the Farman, Hispano-Suiza, German BMW, Jupiter, Gnome & Rhone, and other European engines. (The Farman is a 600-700 hp. 18-cylinder inverted engine running at 2800 r.p.m., with a weight of 700 lb.)

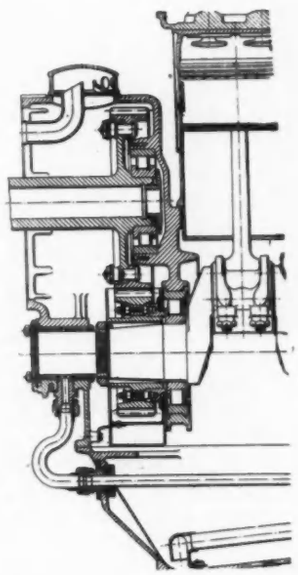


Fig. 5 — Gearing of Napier Lion 1927 engine, which is practically identical with the gearing used by this company during the war

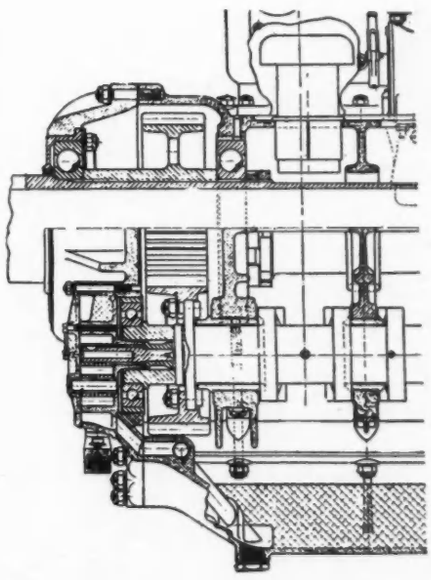


Fig. 4 — Gear drive of King-Bugatti engine (left) comprising two rows of eight cylinders and two crankshafts geared to a common hollow propeller shaft between them

One of the first air-cooled aircraft engines of eight-cylinder design was the Renault, which had the propeller driven from the end of the camshaft. This was the only successful air-cooled engine in France up to October, 1915.

The Fairchild-Caminez engine of recent design utilized the fourth method.

With a planetary or epicyclic type of

* Paper read at the December meeting of the S.A.E. Pennsylvania Section.

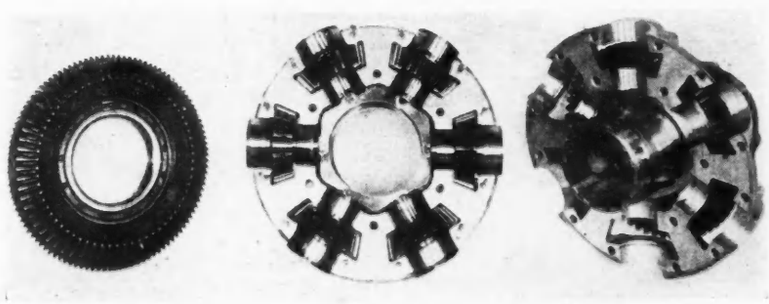


Fig. 7—Pratt & Whitney planetary reduction gear

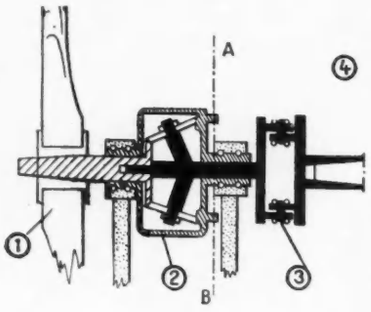


Fig. 6—Principle of Farman aircraft gearing (left), which is here shown as a step-up gear

Fig. 10—Drawing accompanying recent patent to Junkers (below) showing cushioned mounting for geared propeller shaft

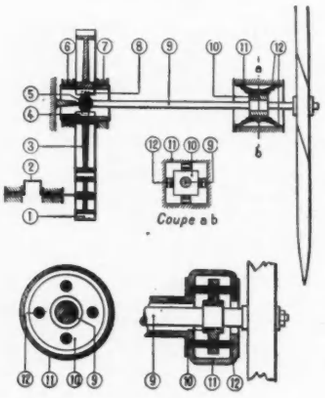


Fig. 8—Early (1917) Lorraine reducing gear as used during the war on Farman, Spad, Voisin and Nieuport planes (right)

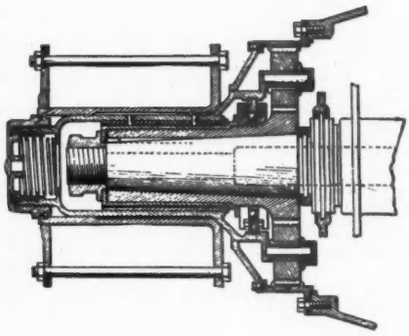
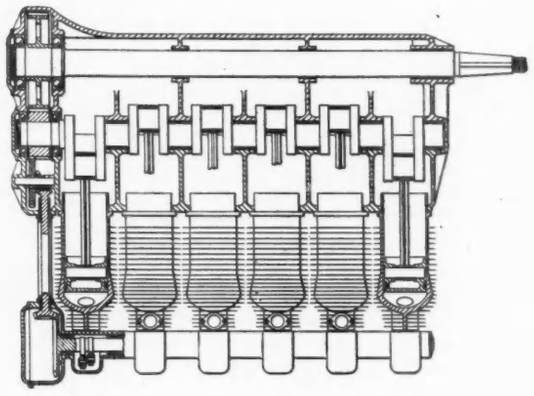


Fig. 9—Design of inverted in-line air-cooled engine (below) suggested by E. D. Heron in an S.A.E. paper



gear, it is possible to obtain practically any gear ratio within reason. This can be accomplished by

1. Slanting the axis of the star pinions.
2. Utilizing double star pinions of differing size.
3. By the use of skew or some special form of gear.

However, most current designs utilize ratios of from 1.3 to 1 up to 2.5 to 1, since few engines exceed 2800 r.p.m., and it seems desirable to have a propeller speed around 1800 r.p.m., although slower speeds, say around 1200 r.p.m., have been utilized.

There are two principal reasons for gearing a propeller: (1) To reduce tip speed; (2) To enable the propeller to give a higher thrust at low air speeds.

"The gear ratio should be such as to give a tip speed of about 800 ft. p. sec. Gearing to a lower tip speed than this gives no improvement in propulsive efficiency, because any increase in diameter requires heavier propellers and increased height or length of the landing

(Continued on page 946)

Specifications of Geared Engines (Early Types)

Engine Make and Type	No. of Cyl.	Bore	Stroke	Gear Ratio and Type	Engine Speed	B. Hp.	Weight	Wt. Per Hp.	Remarks
European									
Rolls-Royce Falcon	12 V	4.0	5.75	1.7*	2250	280	686	2.45	
Eagle	12 V	4.5	6.5	1.67*	1800	360	900	2.5	
Sunbeam Arab	8 V	4.72	5.12	†	2000	235	...	2.5	
Napier-Lion	12 W	5.5	5.12	1.52†	1925	450	850	1.89	
Renault Air-Cooled	8 V	3.94	..	2.0†	1800	...	...	...	First successful air-cooled V. See A. I., Oct. 15, 1914 and Oct. 21, 1915.
Renault (1917-1918)	12 V	5.9	6.9	1.5†	1750	550	...	...	
Peugeot	8 V	3.94	..	2.0†	2150	238	...	...	First aircraft engine of high m.e.p.
Sunbeam Manitou	12 V	4.33	5.31 & 5.59	1.57†	2000	314	...	2.5	Articulating conn. rods, hence two strokes.
Siddeley-Deasy Tiger	12 V	6.39	7.08	1.26†	1700	650	1350	2.1	Built in 1917 for bombing planes.
Lorraine-Dietrich	8, 12, & 24 V & W	4.72	5.52	1.43‡	1750 to 2000	...	...	1.9 to 2.36	Wide variety of engines based on Mercedes.
Jupiter Radial	9 R	5.75	7.5	*	1800	450	662	1.47	
American									
King	12 V	5.5	7.0	1.45†	1886	550	990	1.8	Wide tooth spur gears (3½")
King-Bugatti	16 P	..	..	1.5†	....	410	...	...	Double crankshaft engine.
Duesenberg H	16 V	6.0	7.5	..	1800	800	...	...	
Howard (1917)	12 V	4.5	..	2.0†	3000	300	650	2.17	Design of R. M. Howard. See A. I., Oct. 18, 1917.
Sturtevant	8 V	4.5	5.5	1.67†	2250	210	480	2.28	

‡ Planetary gear. * Epicyclic gear. † Spur gear.

For specifications of more recent types, including Farman, Bristol, Daimler-Benz, Napier-Lion, Rolls-Royce, B. M. W., Junkers, Packard, Curtiss, Pratt & Whitney, Isotta-Fraschini, and others, see Automotive Industries, May 7, 1927; July 9, 1927; Feb. 18, 1928; July 21, 1928; Sept. 22, 1928; Nov. 10, 1928; Feb. 23, 1929; March 2, 1929, and Engineering (London), Nov. 4, 1927.

Compression ratio of Renault, King and King-Bugatti engines in above list approximately 5 to 1.

Alvis Produces *Front-Drive Car With Eight*-Cylinder Engine

Powerplant is of the vertical type of special design. The transmission is constructed so as to extend forward of the front axle. Roots blower used.

ONE of the firms prominently engaged in the development of front-drive cars in Europe is the Alvis Car & Engineering Co., Ltd., of Coventry, England, which until recently produced a front-drive car with four-cylinder engine, in addition to one four and one six with rear drive. Now a front-driven eight has been added to the product, of which a number of assembly drawings are reproduced herewith.

The engine is of the vertical type and was specially designed for this car. It has a bore of 2.165 and a stroke of 3.09 in., giving it a piston displacement of 91 cu. in. This may seem a very small displacement, but the compression ratio is 6.4 to 1, a supercharger is fitted, and the two-seater sports model is guaranteed to do better than 100 m.p.h. on the half-mile track at Brooklands.

Combustion chambers are hemispherical, and the valves are set in the cylinder heads so as to make an angle of 90 deg. with each other. They are operated by two overhead camshafts which are driven from the crankshaft through gearing at the forward or driving end. The crankshaft is supported in five bearings, including three plain intermediate and two roller-type end bearings. Roller bearings are used also in the big ends of the connecting rods. The force feed lubrication is extended to the camshafts, which are hollow, one lead of the oiling system connecting to the rear bearing of each camshaft. It will be noted that no accessories are mounted in the V of the engine, one magneto and one battery ignition unit being mounted on brackets at the forward end, concentric with the two camshafts.

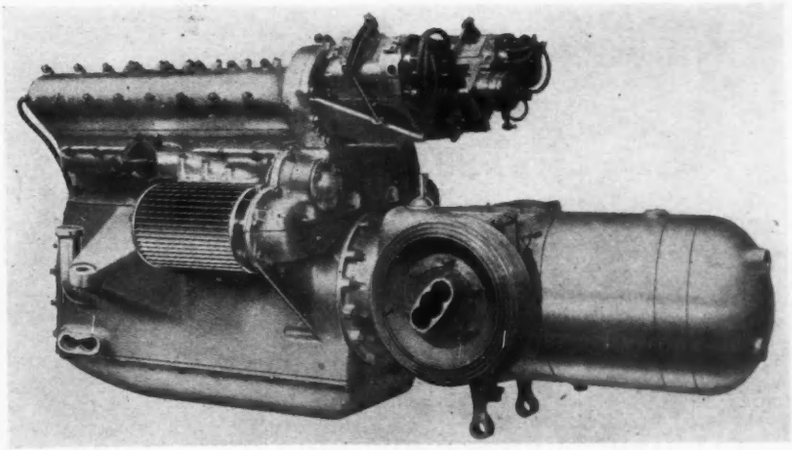
The supercharger used is of the Roots blower type and is driven through gearing encased in the same housing as the camshaft gearing.

Engine, clutch, change-speed gear, and final drive form a single assembly which is supported from the chassis frame at three points, one supporting arm being cast on each side of the crankcase near the middle of its length, while the third point of support is on top of the final drive housing, the transmission extending forward of the axle.

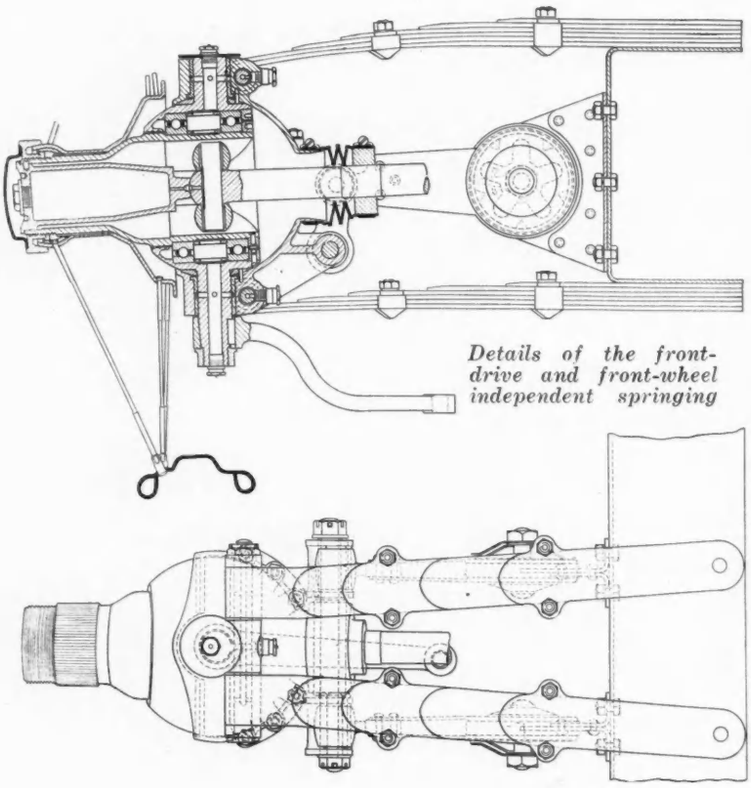
From the drawings of the transmission and final drive it will be seen that the clutch shaft passes underneath the differential and extends all the way through the transmission case, having three bearings in the housing. It carries four pinions which are adapted to mesh with corresponding gears on a splined shaft above and slightly to one side of it, which has the final drive spiral bevel pinion forged integral with it. For the high speed, gears with equal numbers of teeth are used, while for the lower speeds the reduction is obtained in a single step. An interesting feature is the arrangement of the clutch control, which is rather indirect, through a sliding rod extending through the upper part of the transmission housing, a double-armed lever at the forward end of the housing, and another sliding rod extending through the hollow clutch shaft.

The drive to the front wheels is through two short propeller shafts which have a single universal joint at each end. These joints are of the pot type, with trunnion blocks on a cross pin adapted to slide in grooves in the pot. The ends of the propeller shafts are ball-shaped and the shafts are held lengthwise between stops, of which one is screwed into the hollow driving spindle.

No front axle of the conventional type is used, its place being taken by eight comparatively short quarter-elliptic cantilever springs which are fastened to the frame and at their outer ends support two steering heads. These steering heads are made in halves, upper and lower, which are bolted together after they are passed over trunnions formed integral with the knuckle. The steering head forms a spherical housing and the knuckle is turned with a spherical surface which conforms to the spherical bore of the steering head so as to form a closed chamber for lubricant. There is a large central hole in the spherical housing of the steering head on the inner



Powerplant of the Alvis front-drive eight



Details of the front-drive and front-wheel independent springing

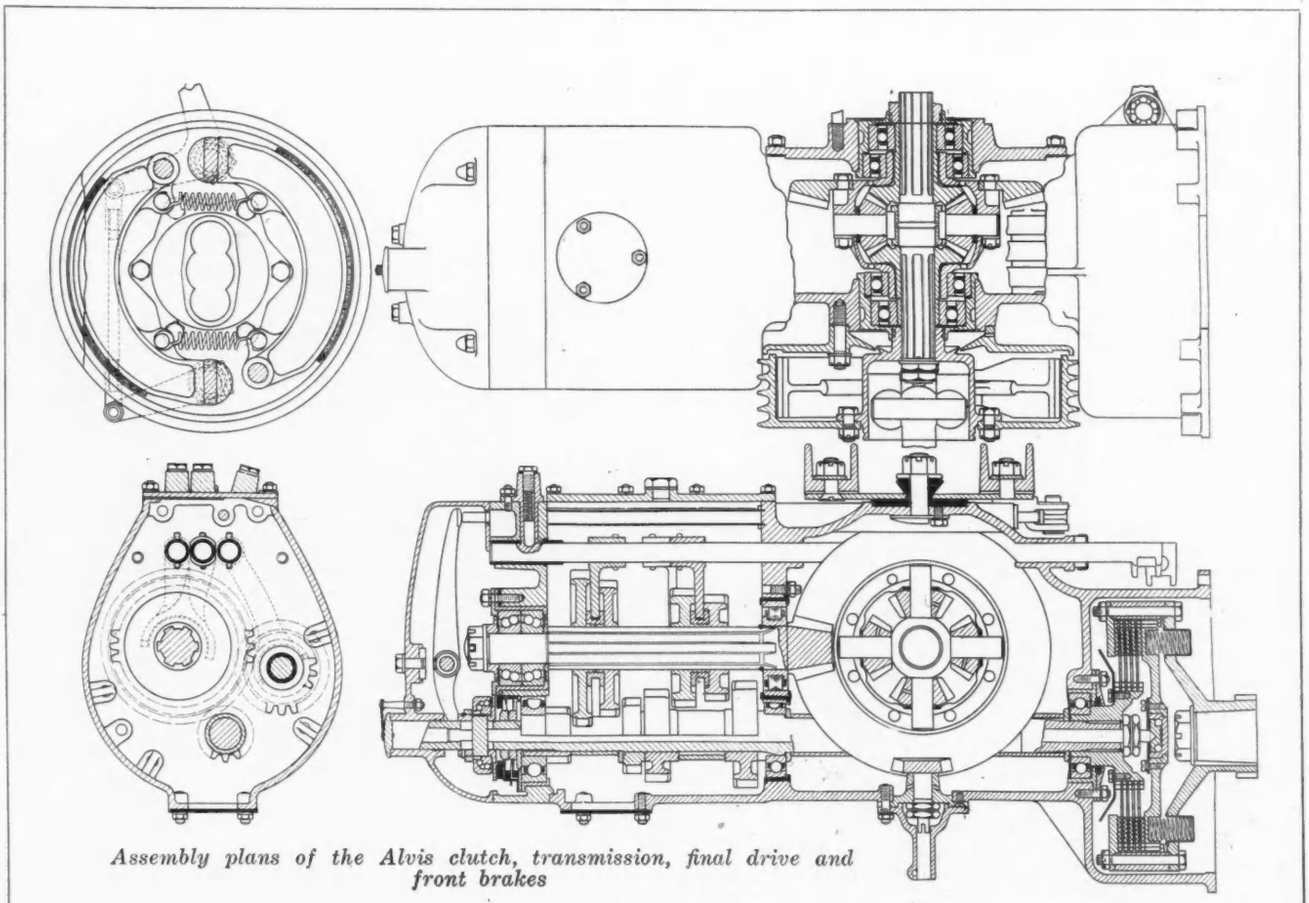
side through which the driving shaft passes, and an oil-tight and dust-tight joint is effected by means of a leather boot.

The steering knuckle proper consists of a shell which is bored to receive the outer races of two ball bearings and has the steering trunnions extending radially from it. The inner races of the ball bearings are mounted on another shell or pot which forms part of the universal joint at the wheel. Upon this shell the front driving wheels are mounted by the usual tapered serrations, nut and locking device.

Individual connections are made from the steering gear to each front wheel. Steering arms on both sides turn in a horizontal instead of in a vertical plane.

The rear wheels also are independently sprung, by means of two half-elliptic cross springs.

The frame is of quite unusual design. At the rear there is a kick-up over the rear cross springs which is in a separate piece that is riveted to the frame side rail. Two channel-section cross-members connect the side rails at this point. The spring saddle is secured to these two cross-members at the middle. The braking torque, apparently, is taken up through the shock absorbers, whose arms connect to the frame side rails at the kick-ups, and to arms formed on the axle spindles, respectively.



Assembly plans of the Alvis clutch, transmission, final drive and front brakes

Eight Cincinnati Installations Aid in Reducing Costs

Production economies may be derived from the use of standard milling machines, equipped with special work-holding fixtures or multiple spindle construction.

AS we enter the 1930 period of manufacturing activity, management everywhere is insistent on the cutting of costs in manufacturing and distribution alike. An alert master mechanic, tool supervisor or shop superintendent is constantly endeavoring to keep his shop production at the highest rate of efficiency. Consequently, when an additional appeal for production economies reaches him, he is apt to feel that he has already reached his limit, and that nothing more can be done. As a matter of fact, he sets to work, draws upon the experiences of others, looks about in similar fields of activity and recognizes here and there overlooked opportunities for reduction of costs or improvement in the quality of product. It is to the progressive superintendent that this message is addressed and it is with a thought that perhaps a profitable suggestion will come to him from eight recent installations described herewith.

A careful selection of milling operations has been made to cover a variety of parts. For the most part standard machines have been used, equipped with special work-holding fixtures. In one case an entirely special machine is shown as having been a profitable investment, and in another case an alteration has been made to the standard machine in the form of a special multiple spindle construction.

Take the case of the special machine as shown in Fig. 1. It happened that an analysis of this user's requirements made it desirable to construct the machine shown here for milling joint surfaces for counterweights on crankshaft. Heretofore, standard machines were used. Now with this special Cincinnati Miller, production was increased four times and, despite the extra cost of the special over a standard machine, net operating costs were materially reduced.

Fig. 1—Special machine designed for milling joint surfaces of counterweights on crankshafts

It is interesting to note that five surfaces on each of the four counterweight locations of the crankshaft are milled simultaneously. The operator places the work in the special fixture with the main bearings resting upon half-round surfaces so that it receives its rotary location by having the two center crank bearings supported on half-round surfaces. Except for the loading and unloading, the operation cycle is automatic. Two levers are provided at the front of the machine, one starts and stops the spindles, the other controls the feed. Engaging the feed lever starts a cam mechanism which moves the headstocks (spindles) mounted on the cross slides to feed to the proper depth. During this time the crankshaft is automatically clamped over the main bearings by sliding arms.

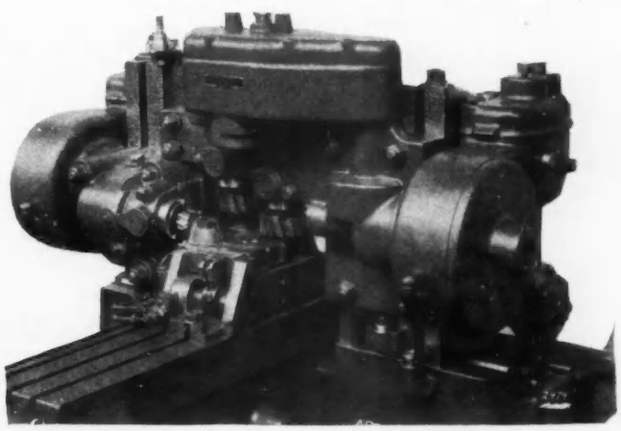


Fig. 2—Equipment for milling boss and pads on gearcase covers

The table then moves from left to right (longitudinally) to clean up the cut. At this point the cam mechanism withdraws the headstocks, releases clamps, returns the table to its starting position and stops the rotation of the spindle. The operator removes the work and continues the cycle as described above.

One-eighth inch stock is removed by eight 3¾ in. dia. x ⅝ in. wide half side mills and eight 3¼ in. x ⅜ in. spiral interlocking cutters, all mounted on four special arbors. The cutters revolve at 75 r.p.m. The

feed is approximately 5 in. per min. or a time per piece of 0.98 min., giving a production per hour of 53 pieces.

Multiple spindles frequently prove a profitable investment and, as in this case, make possible further cost reduction. Here we have Fig. 2, which shows the equipment for milling boss and pads on a gear case cover. A standard 48 in. Duplex Cincinnati Miller is equipped with a special two-spindle horizontal carrier, one spindle having end quill adjustment, and a special two spindle vertical spindle carrier having spindles with end quill adjustment, all supported on the left hand head.

The gear case cover has the face finished and the holes drilled (for the bolts) previous to the operation being performed. The work is set in the fixture so that the finished face rests upon the bottom of the fixture and receives its location from the dowel pins which fit into the previously drilled bolt holes. Two air clamps, one at each end of the fixture, clamp the work securely.

The air-clamping fixture used is a quick, convenient

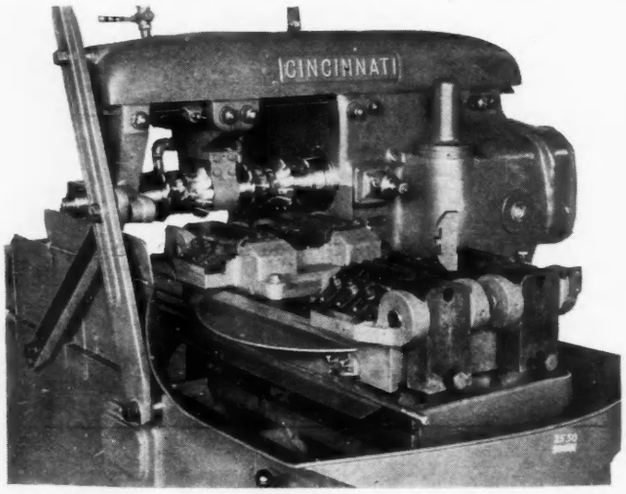


Fig. 4—Hydromatic miller using variable feeds through hydraulic drive for simultaneous milling of crankshaft counterweights

means of removing and loading the work. Four operations were combined in this one setting, eliminating the necessity of other machines for milling the different surfaces.

One-eighth inch stock is removed by two 3 in. dia. shell end mills and one 4 in. and one 6 in. dia. shell end mills on vertical spindles. The feed is 11½ in. per min., giving a time per piece of 1.37 min. or a production per hour of 38 pieces.

Fig. 3 shows another crankshaft operation, that of milling locating pads on the steel forging removing 1/16 in. stock. A 24 in. Cincinnati Duplex Automatic Miller with a double pitch leadscrew and nut, longer table with 36 in. travel, special front bed extension bracket, standard 12 in. x 36 in. index base and a special fixture designed by our Engineering Service Department is used for milling the locating pads of a crankshaft.

The special fixture mounted upon the index base is so designed that the three rough ground bearings of the crankshaft rest in hardened vees. A prick mark is made on the crankshaft on a radial line with the center for locating the crankshaft. A special spring operated plunger located between the two bearing supports farthest from the cutters fits into this prick mark. The slide in which a plunger is mounted can be adjusted should the position of the prick mark be changed. Pilot wheel operated clamps hold the crankshaft securely in these ways.

One of the many uses of the standard index base with standard machines is employed. Here the crankshaft has the locating pad milled on both ends. The operation consists of loading the piece in the fixture, rapid advance to cut, milling the locating pad on one end, and rapid return automatically to the loading position. The index base is swung 180 deg. and locked into position and the table is rapid-traversed to the feed position and the cycle continues in the same manner.

The feed is 10.2 in. per min. giving a time per piece of 1.98 min. or a production per hour of 27.3 pieces. All of the table movements are controlled automatically by dogs so the operator simply has to load and unload the work and throw in the feed.

Another example of cutting cost with standard machines is shown in the application of the new Hydromatic Miller, Fig. 4, which recently has been installed for form milling from rectangles on a crankshaft counterweight. This installation takes advantage of the latest development in milling machine practice on machines of this character, using variable feeds made possible through the hydraulic feed drive.

Two sets of counterweights are milled simultaneously by two gangs of form cutters mounted on the 2½ dia. arbor. Each gang consists of two alternate tooth slotting cutters and two special form radius cutters.

Two special vise type work-holding fixtures are mounted on the index base. Each fixture accommodates two sets of counterweights, each set consisting of six individual pieces. Counterweights are located by tongues which fit in previously machined slots and are clamped from their sides by toe clamps and at the ends by hinged clamps. In order to increase the rigidity of the arbor, end braces and a special cap type center arbor support are used.

The index base method of milling insures almost continuous production, that is, while the milling

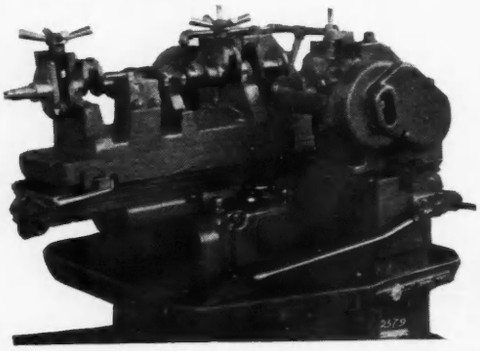


Fig. 3—Standard machine (left) with special work-holding device for crankshaft operations

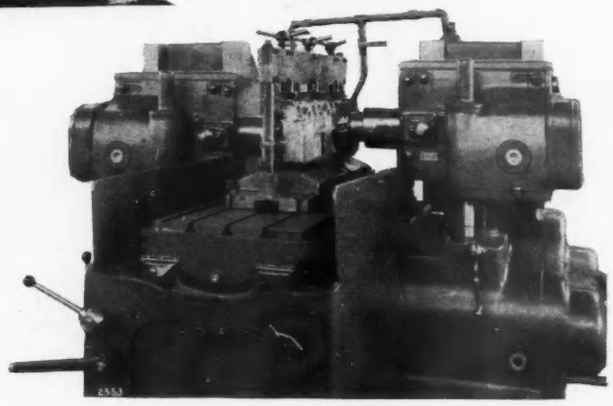


Fig. 5—Installation in European plant for milling the sides of an aluminum cylinder block

cut is taking place on one end of the base, the operator unloads and loads the work on the other end. The variable feed attachment regulates the rate of table travel so as to eliminate practically all excessive shocks or jerks when the cutters enter the work, thus insuring perfectly smooth table travel.

The hydraulic feed makes possible increased production, lower upkeep cost, and as in the case of most hydraulic milling machines, prolongs cutter life. The feed is about 3 in. per min. on the average giving a time per piece of 0.33 min. or a production per hour of 160 pieces. Dogs automatically control all table movements.

A recent installation in the plant of a manufacturer of motor cars in Europe is shown in Fig. 5. Here a Standard Duplex Hydromatic Machine is milling the sides of an aluminum cylinder block using a 12 in. face mill and an 8½ in. high speed steel face mill. The cutter revolves at 416 r.p.m. The table feeds at 30 in. per min., giving a time per piece of 3.38 in. per min., or a production per hour of 15. European requirements are somewhat different from those in the United States, and this job perhaps would not be handled in the same way by every company, but with standard machines such as are offered today, either milling machines or other types of machine tools, make it possible to adapt the high productive features of these tools to the particular requirements of the manufacturer concerned and do it economically.

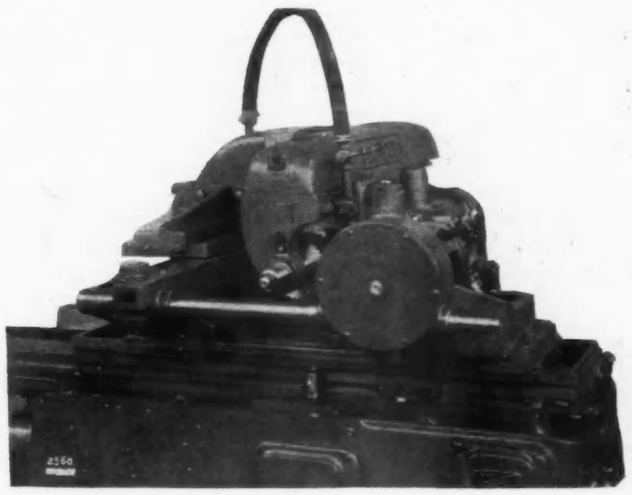


Fig. 8—Standard hydromatic miller with special fixtures for milling connecting rods

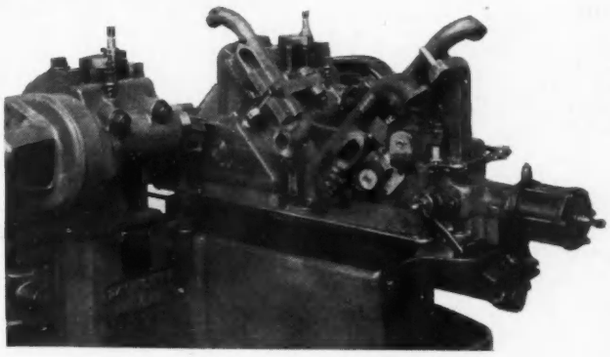


Fig. 7 — Automatic air-clamped fixtures (left) are used in the milling installation shown

Fig. 6 — Milling bosses to length on steering knuckles

Fig. 5 shows a cylinder block which is located in a special fixture mounted on the table. It receives its location from the finished bottom and two cored holes in the casting. Clamping is provided by three clamps actuated by three pilot wheels.

The exceptional rigidity of this machine coupled with the effectiveness of the Cincinnati locked hydraulic feed permits the rapid milling of these cylinder blocks.

Although 30 in. feed per min. is used, the accuracy obtained on this job is exceptionally good, being plus or minus 0.001 in. on the entire length of the two pads.

In Fig. 6 one limiting factor to the rate of feed ordinarily possible on a job of this kind is the increasing amount of metal to be removed as the cutter nears the end of its travel. The job is that of milling bosses to length on steering knuckles. This happens to be a duplicate of similar equipment supplied a few months earlier. The first equipment demonstrated conclusively the advantage of variable hydraulic feed which makes it possible to start the table at a fast rate when the bosses are being milled and to slow down momentarily when the cutter reaches its full depth. Another profitable feature found on this equipment is the positive stop and delayed trip mechanism, which makes it possible to duplicate these parts, each one having the same desired accuracy. These features demonstrate the high development of modern machine tools and show clearly that standard equipment today can really do more than special machines which were constructed but a few years ago.

One left and one right-hand steering knuckle are held in a special fixture mounted at each end of a standard 16 in. by 30 in. index base, set so that two pieces are held abreast in each of the fixtures. The shank of the knuckle rests in a vee and the boss end rests upon a fixed support and is pressed against end stops by two adjustable stops. A heavy-hinged clamp having two fingers, operated by a pilot wheel, clamps the two knuckles in place.

The variable feed attachment insures constant maximum metal removal throughout this varying cut. The positive stop and delayed trip allows the table to move against the positive stop, dwell to clean up the bottom and then rapidly return at 300 in. per min. All of these operations are automatic. Experience has shown that hydraulically driven machines usually bring longer cutter life. This held true in this particular case, the life of the cutter being increased 160 per cent. The average feed on this job was 3.5 in. per min., giving a time per piece of 0.39 min. or a production per hour of 141 pieces. *(Turn to next page, please)*

The milling of the heater pad and the exhaust outlet pad on cast iron exhaust manifolds is shown in Fig. 7. Here the special automatic air-clamping fixtures used are mounted directly on the table. The manifold has the cylinder face pad milled and bolt holes finished previous to this operation so that these furnish surfaces by which to locate in the special fixtures.

Four pieces are held in the fixture. On one side, one piece is held and the heater pad is milled, and the other piece is held for milling exhaust outlet pad. The manifolds are loaded in the reverse order on the right side of the fixture.

The manifold in the fixture nearest the cutters rests on the cylinder face pad, and the flange of the exhaust outlet and acts against a fixed stop, while the other end of the manifold (tube), resting between two pins, is clamped into this position by one air-operated clamp. The other manifold, farthest from the cutters, rests upon the cylinder clamps. The clamp inside the cored section (cylinder pad) pulls the manifold securely against the rest. The other clamps prevent it from moving in a vertical direction.

Advantages in Single Unit

There are several advantages in this method, one machine giving the same production as three machines in another plant nearby. All of the production required for line production is obtained from this one machine. The combining of cuts, two pads milled on each piece on each side, is another interesting feature. Using this equipment, the production obtained was 75 pieces per hour.

The final example of cutting cost with carefully thought out milling equipment is shown in the 4-36 Plain Hydromatic Miller equipped with special fixtures —Fig. 8. The complete equipment consists of this standard machine with the variable feed attachment, a special arbor support, and a special 90 deg. automatic indexing and automatic clamping fixture for holding four connecting rods. On the side of the table a new style trip plunger and reverse stop dogs obtains 15/16 in. minimum travel from rapid traverse to feed.

A simple cutter gang-mills both lugs and splits one-half of a crank pin end of two rods with a saw, giving one finished rod each time the fixture indexes and making possible an accurate splitting operation. Any conventional size of connecting rod can be milled.

Special Indexing Fixture

The special four station indexing fixture holds one rod at each station. The rod rests on the finished crankpin boss and is located by two studs, one which fits in crankpin hole and the other in the wristpin hole. Both holes are previously bored to accurate limits. The fixture automatically indexes on the forward stroke bringing two rods into position for milling. The previously milled rod is removed, another rod loaded and a U-washer placed under the stud, during the remaining period of the forward stroke. On the return stroke, the rod is automatically clamped into position and another rod is unclamped. The cycle of operation continues in a similar manner, with the indexing and loading on the forward stroke.

The variable feed attachment makes it possible to feed slowly upon entering the cut and then speed up after the cutters are underneath the sharp corners of the bosses or lugs. As the larger area of the cut is approached, the table slows down automatically and finally moves against the positive stop, giving accurate depth of cut. This equipment may be supplied with either hand indexing or automatic indexing fixtures.

Production per hour using this equipment is approximately 149 pieces. It should be noticed that this production and the other results given in the foregoing examples represent satisfactory performance in the shops in which the machines are now used and that the conditions in each shop vary.

Geared Engines for Airplanes

(*Continued from page 940*)

gear. The result is that the theoretical gain in efficiency is entirely lost."*

About two years ago it was said that "The use of gearing introduces many serious problems which have not been solved. Gearing adds weight and complication to the engine, and this requires additional weight in the structure to carry it. Much more serious, however, is the multiplication of the torque reaction on both the engine and airplane structure. At present it seems that the strengthening of both the engine and its mounting to take care of the greatly increased torque due to the low-speed propeller, will add must more weight. This, coupled with the weight added to the engine by gearing, and an increase in propeller weight, will offset the advantages of the geared installation."

"Damping having been shown to be an unsatisfactory method of overcoming vibration troubles, only one alternative is left, namely, to arrange the shaft of an engine in such a way that the critical speeds are all either below or above any speed at which the machine may be required to operate continuously in service."†

Another factor, the decreased propeller speed has in a few cases required additional radiator capacity for the engine because of the decreased slip-stream velocity behind the slower turning geared propeller. This has tended to increase the weight of an airplane powered with a water-cooled engine.

It is the belief of European engineers at the present time that for power outputs of 500 hp. and more with from 12 to 24 cylinders, engines will soon run at 3000 r.p.m. The Farman engine previously mentioned, which runs at 2800 r.p.m., may be taken as an index of what is considered desirable in France. Some designers feel that the gear reduction problem has been solved, so that when gearing is combined with supercharging it should be possible to reduce the engine weight to close to 1 lb. per hp.

As to the trend in compression ratios, whereas the average compression ratio for service engines is between 5.10 and 5.44 for direct drives, geared engines may be operated at high crank speeds with a compression ratio of 5.9, and even higher when the more specialized fuels are used. Some special types have operated with ratios as high as 10 to 1, although from 7 to 8 to 1 is about the maximum.

With engine speeds now in the realm of from 7000 to 10,000 r.p.m. and even higher, it seems illogical to the writer that a mere 3000 r.p.m. can be considered a maximum. Very reliable performance has been attained with supercharged engines running at 6000 r.p.m., so that from 4000 to 5000 r.p.m. seems commercially attainable. If so, a gear reduction of from 3 to 4 to 1 would be required with present propellers.

In conclusion, therefore it would appear that we have not as yet reached the goal of development of the geared engine for aircraft.

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* See "Aircraft Propellers," by Lieut. Com. Clinton H. Havill, U.S.N., S.A.E. Journal, January, 1929.

† See article by James Calderwood in Journal and Record of Transactions, The Junior Institution of Engineers, Volume 37, pt. 12, September, 1927, original paper, pages 607-617, discussion 617-622.

Just Among Ourselves

A Happy and Really Prosperous New Year

WELL, here we are back from the North Pole and our interview with Santa Claus just in time to rush out these greetings for a really Happy and Prosperous New Year, pack up our old kit bag again and hop to New York for the opening of the 1930 Automobile Show. . . . . And while these good wishes for the New Year that we offer herewith are well meant and sincere, we admit a craving to get over to that New York Show this year, get a good look at the new products of the industry assembled under one roof, and talk with a lot of men from every part of the industry in an effort to confirm our present idea that a prosperous 1930 really is possible and probable—at least for those willing to work twice as hard as in 1929.

* * *

An Appreciation For Your Good Wishes

HOLIDAY times always mean strenuous rush work for people publishing periodicals that have to get out, whether Christmas and New Year's are to be celebrated or not. In that holiday hurry, however, we always find a few quiet hours to enjoy thoughts and recollections of friends from whom we haven't heard for many moons, and whose personalities come in through Christmas greeting-card proxies.

This year was no exception. Warm wishes expressed in good old-fashioned terms, fresh greetings conveyed on modernistic backgrounds, and novel expressions sent in unique forms all brought us equal pleasure and enjoyment. To all of our friends we make acknowledgment and express our sincere appreciation of their having remembered us again.

We got an especial kick out of the card which brought greetings from L. H. Pomeroy, general manager, Daimler Co., Ltd., of England, whose many American friends have missed his enlivening discussions at S.A.E. meetings for several years. Mr. Pomeroy's card looked like this:

And it read: "To my elders and betters for their toleration and guidance; to my colleagues for their help and confidence; to my staff for their loyalty and devotion; to all my friends at home and abroad, all the jolly things that Xmas means and an even break for 1930."

* * *

Show Week in New York Acts as Sales Stimulant

TOO much emphasis should not be laid on the potency of this January 1930 show as a direct sales stimulator at that. Just as in past years, the New York Show will be a definitely constructive merchandising force, but relatively light actual buying during show week need not be interpreted as portending a bad spring for the industry. Personally, we don't think analysis of actual buying at the show means a whole lot one way or the other.

By focusing the attention of hundreds of thousands of people on the automobile business in a favorable light every year, the automobile shows do their forceful job of publicity and promotion for the industry, regardless of direct, immediate sales results.

. . . . Nevertheless, we'll be looking over New York Show Week sales results with much interest, just like everybody else.

* * *

Now Is the Time For Study and Analysis

WE wonder how many automotive production department executives are making definitely constructive use of the spare time which has been accorded many of them recently due to low demands for actual product manufacture? When all the wheels are turning and the sales department is howling for deliveries, words like "study," "analysis," "investigation," and so forth, don't fit at all well into the daily thinking of the average production man. But they must fit into his thinking some time if he's going to make the kind of progress he hopes for.

Now is the time!

"Every one of our machine tool builders," says Ernest F. DuBrul, general manager, National Tool Builders Association, "could now go through his own shop and make a list of all the machines that could and should be replaced. . . . . One company that we know of has already made such a survey and finds that it can safely and conservatively order about $150,000 worth of machine tools. . . . . This is good policy."

We agree with Mr. DuBrul. Low manufacturing activity on the part of production executives should mean high mental and survey activity, if our guess is any good.—N.G.S.

Willys-Overland Adds Two Sixes to Commercial Car Line

Four-speed transmission and four-wheel brakes, giving characteristics of passenger vehicle, are standard on 1½-ton models to be exhibited at the New York Show.

TWO new models have been added to the line of commercial vehicles of Willys-Overland, Inc., a 1½-ton Willys Six, Model C-101, and a 1½-ton Willys-Knight, Model T-103. The new Willys-Overland Six truck is equipped with a six-cylinder 65 hp. engine and a four-speed transmission, which is said to give it speed characteristics similar to those of a passenger car. The engine has a bore of 3¼ in. and a stroke of 3⅞ in. and develops its 65 hp. at 3200 r.p.m. Cylinders and crankcase are in a single casting, and the cylinder head is removable. The piston displacement is 192.9 cu. in.

A Tillotson carburetor is fitted and the electrical system (generator, starter and ignition unit) is of Auto-Lite make. The battery is a USL of 115-amp.-hr. capacity. The lighting equipment includes twin-beam headlamps and combination stop and tail lamps. Engine lubrication is by the pressure system, with a gage on the instrument board. Fuel is carried in a 11-gal. tank mounted underneath the seat, and fuel feed is by vacuum tank. The engine oil capacity is 6 qt. The cooling system comprises a Fedders cellular radiator, centrifugal pump, circulation control thermostat, and four-blade, 15-in. fan driven by an adjustable V-type belt.

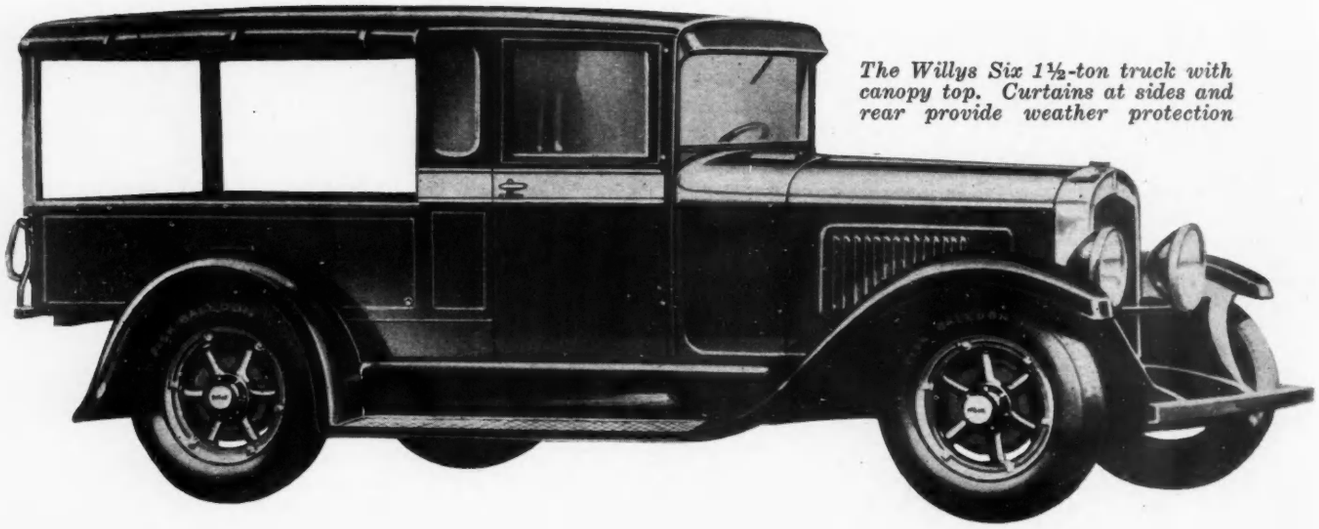
The clutch is a single-plate type, 10 in. in diameter. The transmission is a four-speed device giving the following ratios: 6.16:1, 3.18:1, 1.74:1 and 1:1, the reverse ratio being 7.25:1. A 10-splined main shaft is used, which is supported in a Hyatt roller bearing at the front and a ball bearing at the rear. Provision for a power take-off (S.A.E. small size) is made on the left side of the transmission housing, the gear that meshes with the power-take-off gear having 33 teeth of 6-8 pitch and revolving at 424 r.p.m. for 1000 r.p.m. of the engine.

The rear axle is a Clark, of the semi-floating type, with heavy spiral bevel gear final drive and with double Timken bearings at the wheels. The rear axle housing is of cast steel and said to be very rigid. A final drive ratio of 5.44 to 1 is provided.

Four-wheel mechanical brakes are fitted, the front-wheel brakes being Bendix internal three-shoe brakes, 1 11/16 in. in diameter, and the rear wheel brakes—external brakes of Willys-Overland manufacture—14 in. in diameter. Parking brakes of the internal type act on the rear wheels, on the same drums as the service brakes. The braking area is 269 sq. in. for the service brakes and 131 sq. in. for the parking brakes.

The tread of the chassis is 55⅝ in. at the front and 58 in. at the rear. The wheelbase is 131 in. and the chassis is adapted to receive a considerable variety of bodies, including a fully inclosed panel body with two rear doors, a canopy-top body with curtains at the sides and rear for the protection of merchandise in bad weather, a screen-type of body with a locking gate for the protection of merchandise, mail, etc., and a stake body.

The frame is made of 5/32 in. stock, with side rails 6 in. deep and with flanges 2¾ in. wide. Front springs are of chrome-vanadium steel, half-elliptic, 36 by 1¾ in.,



The Willys Six 1½-ton truck with canopy top. Curtains at sides and rear provide weather protection

while rear springs are of carbon steel, half-elliptic, 45 by 2½ in. The steering gear is of the worm and wheel type, with 11 to 1 ratio and fitted with a 17-in. steering wheel. The turning radius of the chassis is 25¾ ft.

The shipping weight of the chassis is 2675 lb. and the gross weight allowance for the truck is 7000 lb.

The new Willys-Knight 1½-ton truck, Model T-103, has substantially the same chassis specifications as the Willys Six but is fitted with a six-cylinder Knight sleeve-valve engine of 2 15/16-in. bore and 4⅜-in. stroke (177.9 cu. in). Bodies are interchangeable for the two lines, as they are to serve in the same fields.

Atterbury Offers Light Truck Series

THE Atterbury Motor Car Co., Buffalo, N. Y., presents three 1930 models of 1, 1½ and 2-ton capacity which constitute a lighter series than the Marathon Sixes, which were described in the August 31 issue of *Automotive Industries*. These new models, which are now in production, give Atterbury dealers a line ranging from 1 to 4 tons in capacity.

The three models have been standardized in design, so far as possible, to simplify maintenance and parts supply. All embody six-cylinder engines, Brown-Lipe multiple disk clutches, four-speed Brown-Lipe transmissions, Timken front and bevel gear rear axles, Zenith carburetors, steel wheels with pneumatic tires and Lockheed hydraulic four-wheel brakes.

A relatively high and narrow hood with crown fenders and streamlined cowl and front bumpers characterize the front end appearance. The 14 gal. gasoline tank is mounted in the cowl.

The frame, with gussets on cross members, is 5½ in. deep on the 1-ton model and 5¾ in. deep on the other models. The common flange width is 2¾ in.

Engine of the 1-ton model is a 2⅞ by 4¾ in. six, rated at 56 hp. at 2800 r.p.m., while a 3¼ by 4½ in. engine, developing 60.5 hp. at 2750 r.p.m., is used on the 1½ and 2-ton units.

A cellular type radiator with polished tanks is employed on all three models. Steel spoke wheels are used on the 1 and 1¼-ton chassis and Budd steel disk wheels on the 2-ton model.

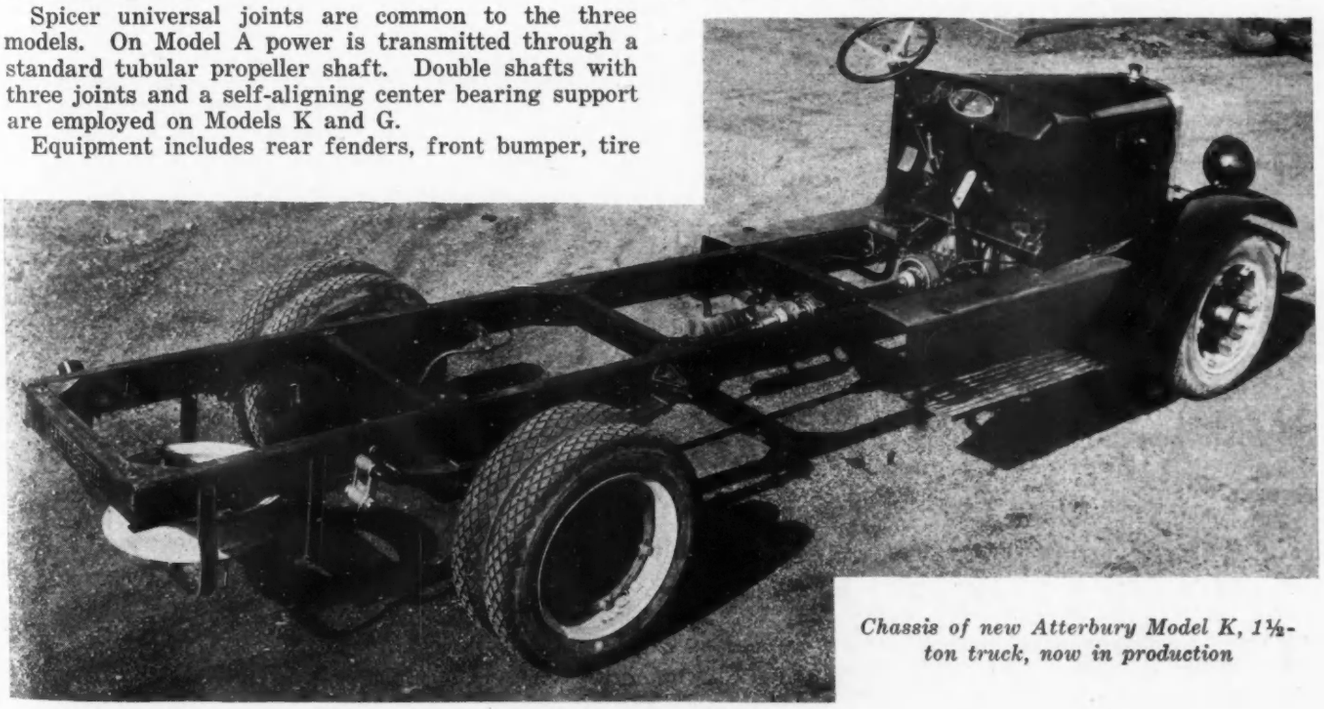
Spicer universal joints are common to the three models. On Model A power is transmitted through a standard tubular propeller shaft. Double shafts with three joints and a self-aligning center bearing support are employed on Models K and G.

Equipment includes rear fenders, front bumper, tire carrier under rear of frame, speedometer and gasoline gage, in addition to the usual items.

Specifications of Atterbury Models

Model	A	K	G
Capacity	1-ton	1½-ton	2-ton
Chassis weight with cab	3915 lb.	4215 lb.	4450 lb.
Wheelbase, standard	132 in.	145 in.	145 in.
Tires, front	30 x 5	32 x 6*	32 x 6
Rear	30 x 5	32 x 6*	32 x 6 dual
Engine, make and model	Lycoming	Lycoming	Lycoming
Size	6-2⅞ x 4¾	6-3¼ x 4½	6-3¼ x 4½
Ignition, make	Auto-Lite	Auto-Lite	Auto-Lite
Starter and generator	Auto-Lite	Auto-Lite	Auto-Lite
Carburetor, make	Zenith	Zenith	Zenith
Fuel feed	Gravity	Gravity	Gravity
Clutch, make	Brown-Lipe	Brown-Lipe	Brown-Lipe
Type	Disk	Disk	Disk
Transmission make	Brown-Lipe	Brown-Lipe	Brown-Lipe
Mounted and speed	4-unit	4-unit	4-unit
Front axle, make	Timken	Timken	Timken
Rear axle, make	Timken	Timken	Timken
Final drive	Bevel gear	Bevel gear	Bevel gear
Type	Full floating	Full floating	Full floating
Ratio, standard	6.8 to 1	6.8 to 1	6.8 to 1
Torque and drive	Springs	Springs	Springs
Steering gear, type	Worm and sector	Worm and sector	Worm and sector
Service brakes	Lockheed hydraulic 4-wheel	Lockheed hydraulic 4-wheel	Lockheed hydraulic 4-wheel

*30 x 5 front and 30 x 5 dual rear optional



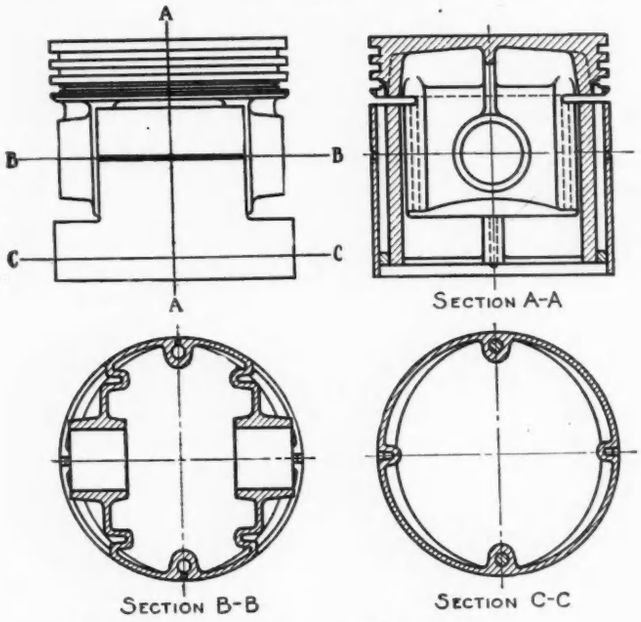
Chassis of new Atterbury Model K, 1½-ton truck, now in production

New Automotive Developments

Self-Lubricating Piston

A "SELF-LUBRICATING" aluminum-alloy piston, which, according to the manufacturers, can be fitted as close as cast-iron pistons, has been introduced by the National Alloys Co., 2118 Woodbridge St., East Detroit. Oil reservoirs are provided behind the skirt on the thrust sides of the piston, and have two openings, one at the top, and one somewhat below the top, in the form of an oil scraper groove.

When the engine is not running the oil in this reservoir remains at the level of the oil groove. When it is started up, the inertia of the oil is said to cause it to flow out through this groove onto the cylinder wall,



Views of the "Oilrite" aluminum-alloy piston

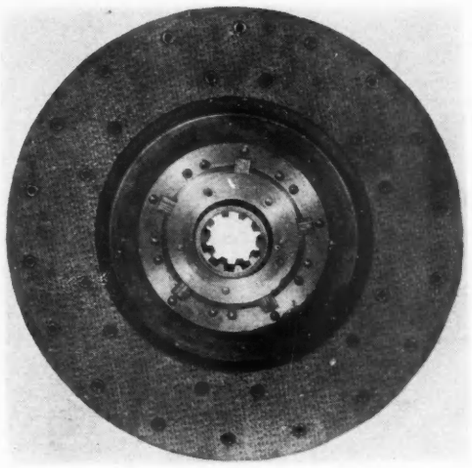
lubricating the piston and wall. Since piston wear occurs mainly during the first few minutes after starting a cold engine, before the oil has warmed up sufficiently to reach the walls, the "Oilrite" piston is said to reduce wear materially.

The piston is a one-piece casting, but the design of the struts is claimed to reduce expansion and to control it. This is said to be due to the provision of expansion "U's" in the pin boss struts. These "U's" also aid in cooling the piston, due to the larger area presented, and thus reduce heat transfer to the skirt through the pin boss struts.

Skirts of "Oilrite" pistons are not split, but expansion "U's" are provided in the pin boss sides of the skirt ring, to take care of skirt expansion. These "U's," however, do not extend to the bottom of the skirt, the latter being reinforced to keep it round.

Clutch Damping Device

THE accompanying photograph shows the driven member of a new single-plate clutch put out by the Brown-Lipe Gear Co. of Syracuse, N. Y. The inner

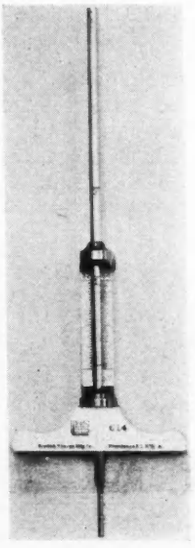


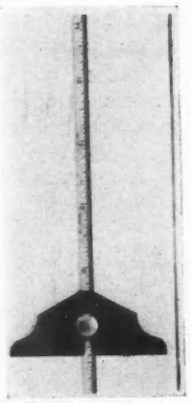
Driven member of Brown-Lipe single-plate clutch

and outer members of the clutch disk are connected by a series of shims of high-grade spring steel, which cushion the drive and at the same time absorb or dampen out any vibration that may be set up, thus preventing noises in the transmission generally referred to as gear clatter.

B & S Depth Gages

TWO new depth gages have been announced by the Brown & Sharpe Mfg. Co. of Providence, R. I. Graduated Rod Depth Gage No. 614 measures the depth of large or small holes, and the depth from 0 to 3 in. can be read directly in sixty-fourths from the graduations on the body of the gage. The wide base and slender rod are said to make this tool convenient for use in measuring holes of either large or small diameter. The first 5/8 in. of the rod is 1/16 in. diameter and the remainder is 1/8 in. diameter.





Drill point and depth gage (above) and graduated rod depth gage (left)

Drill point Gage and Depth Gage No. 617 is a combination of two tools. It can be used for checking the angle and alignment of drill points when grinding them, or it may be used as a depth gage for holes as small as 3/32 in. in diameter. The graduated bevels on the head are ground to 59 deg. The 6-in. rule is graduated to 1/32 in. and 1/64 in. It is also obtainable in metric graduations if desired.

Mechanism of *Clutch Cone* Explained

Cotangent of angle between base of cone and a line from the center of its spherical surface to point of contact of lever is mechanical advantage.

THE question recently came up as to the mechanical advantage of a "cone" and lever as used in a certain type of clutch which is normally held in engagement by forcing the "cone" between the ends of clutch-actuating levers. The mechanism used is of the type illustrated in Fig. 1. The lever is formed with a cylindrical boss of radius r at the end, which makes contact with the "cone." The latter, however, is not a true "cone," the line of intersection of its operating surface with an axial plane being an arc of radius R, instead of a straight line. The problem is, What is the relation of the radial motion of the axis of the cylindrical boss at the end of the lever to the axial motion of the "cone"?

In the drawing the cylindrical boss at the end of the lever is shown in one definite position in a full line, and it is desired to find the ratio between the radial and axial motions for this position. Assume now that the "cone" moves forward a distance dB, so that the boss moves backward relative to it the same distance. In the drawing this motion is indicated as being of quite considerable amount, but what is actually referred to is an infinitesimal motion, in the case of which the line 2-4 is perpendicular to line 1-2. Since 4-5 is perpendicular to 2-3, triangle 2-4-5 is similar to triangle 1-2-3 and we have

$$dA/dB = \tan \theta$$

Hence the ratio of the radial to the axial motion is equal to the tangent of the angle between the base of the "cone" and a line from the center of its spherical surface to the point of contact of the lever. The inverse of this ratio, that is, the cotangent of the angle, is the mechanical advantage of the mechanism.

Sometimes the spherical surface of the "cone" is continued in such a manner that the diameter decreases and if the "cone" is pushed all the way in the ends of the levers approach the axis again, whereby a locking effect is produced. It is desirable to know what is the mechanical advantage when the clutch is in the locked position.

The relations are shown in Fig. 2. The outer surface of the "cone" is developed by two circles which are tangent to each other, one of these having a radius R and the other a radius r equal to that of the boss at the end of the lever. The point of tangency is at A. Let B be the axial distance between the center points of these two circular arcs. Then $\tan \theta$ is evidently equal to $-B/(r + R)$. In a particular case B is 3/32 in. and $R + r$, 15/16 in., hence the mechanical advantage in the pocked position is $15/16 \div 3/32 = 10$. That is, the effort required to start the cone out of the locked position is equal to one-tenth the force with which the levers press radially against the cone. This, moreover, is the force which holds the clutch in its position of engagement.

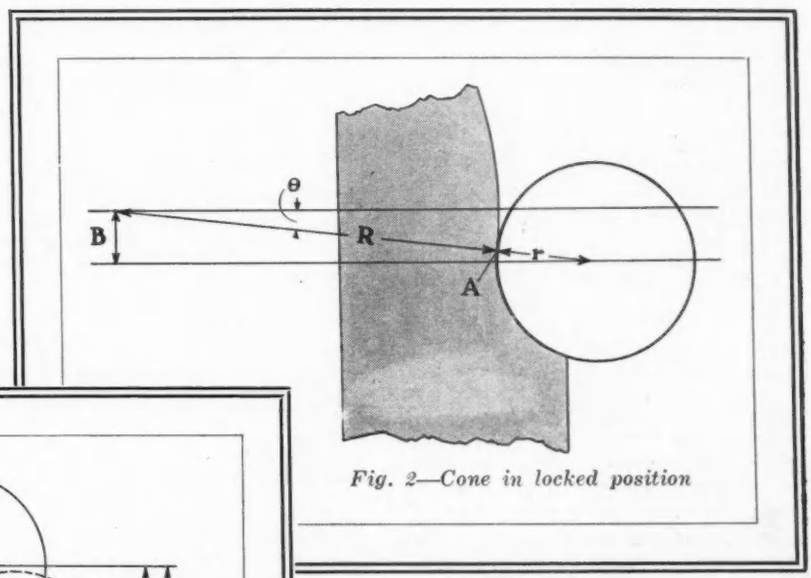


Fig. 2—Cone in locked position

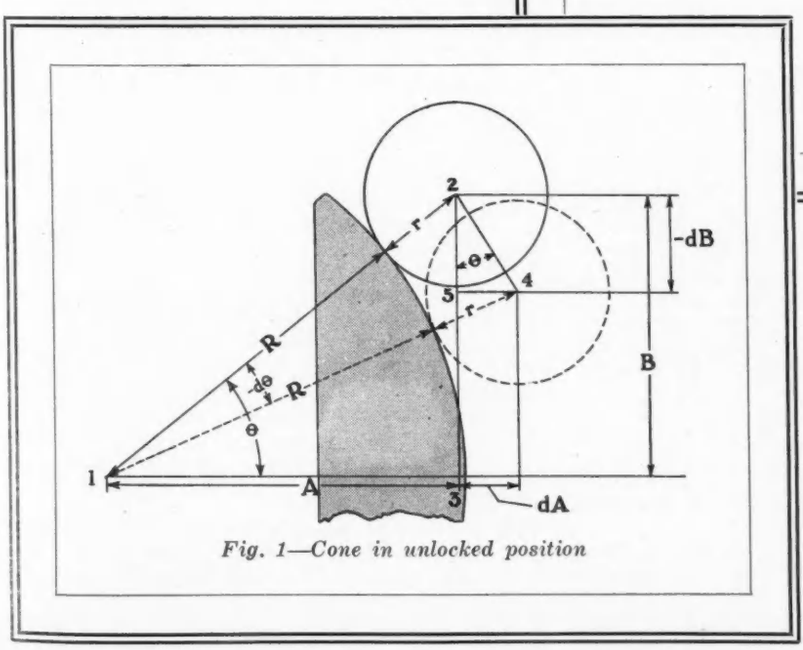


Fig. 1—Cone in unlocked position

First with the News

Reliable, Accurate

AUTOMOTIVE INDUSTRIES

News of the Industry

PAGE 952 VOLUME 61 *Philadelphia, Saturday, December 28, 1929* NUMBER 26

Production Rises to Meet Advance 1930 Schedules

PHILADELPHIA, Dec. 28—Probably the outstanding development in the automotive world during the past ten days, and one which is meeting with favor as an indication of improved factory-dealer relationships during the coming year, has been the announcements by a number of leading manufacturers of upward price revisions for next year, and the announcements of aligning production more closely with dealer demand. Further increases in operating schedules by a majority of the automobile factories have been evident during the past week, in preparation for the introduction of new models. Estimates of the industry's aggregate production during the current month have been revised upward by a number of students of production trends, and the belief is not uncommon that the output for December, exclusive of Ford at least, may exceed that of November, exclusive of Ford.

Car manufacturers will start in 1930 with plants running from 20 to 40 per cent capacity, with the exception of the leading manufacturers in the low priced field. In this group production will be at a higher rate. Manufacturers in this class have been getting their production ready and some of the schedules in this group are already considerably ahead of what they were some time ago.

A representative of the National Automobile Chamber of Commerce, speaking before the Great Lakes Regional Advisory Board at Cleveland last week, announced that freight car requirements for the automobile industry in the first quarter of 1930 will exceed those of the present quarter by 33 per cent. This would mean a decrease of only about seven per cent, as compared with the first quarter of the record-breaking 1929, when production of motor vehicles in the United States and Canada totaled slightly more than 1,500,000. It is believed in some quarters, however, that production during the first quarter of the coming year will show rather a greater decrease from last year's figure than is indicated—taking freight car requirements as a basis of forecast.

Thompson Reports Orders

CLEVELAND, Dec. 23—Release orders on 200,000 valves for Chrysler and Oakland have been received at the Cleveland plant of Thompson Products, Inc. In addition to these releases were inquiries from the American Austin Car Co. and Continental Motors for valves in lots of 300,000 and 200,000.

Curtiss Airplane Qualifies for Prize

NEW YORK, Dec. 26—A Curtiss "Tanager" airplane has passed the eighteen qualifying tests in the Guggenheim Competition for safe aircraft, automatically becoming eligible for a prize of $10,000 and for competition with other planes passing the qualifying tests for the larger prize of $100,000 provided for the final winner. Only one other plane, a Handley-Paige, is at present actively competing. It has passed 14 of the tests.

Engineers to Visit U. S.

PARIS, Dec. 17 (*Special*)—Members of the French Society of Automobile Engineers are preparing a joint visit to the United States during the month of May. Spending two weeks in America, the party will visit Detroit, Milford, Flint, Pontiac, and Philadelphia. By reason of arrangements made with the Society of Automotive Engineers, the following factories will be visited: Ford, Packard, Hupmobile, Chrysler, General Motors laboratories, Hudson-Essex, Long, Gemmer, Timken, Buick, Chevrolet, A. C., Pontiac, Wilson foundry, and Budd Body Works.

Triplex Announces Output

NEW YORK, Dec. 24—Triplex Safety Glass Co. of North America produced 11,000,000 sq. ft. of non-shatterable glass during the current year.

Parker Bill Gives Federal Bus Code

Hearing on New Regulatory Measure Set for Jan. 8

WASHINGTON, Dec. 26—The Parker Bill, providing for Federal regulation of passenger buses in interstate traffic, will be taken up by the House Committee on Interstate Commerce Jan. 8, according to Rep. Parker (Rep., N. Y.), chairman of the committee and sponsor of the bill.

The Motor Bus bill deals only with passenger traffic. It provides for supervision of such agencies by the Interstate Commerce Commission in cooperation with state commissions. In the first instance, cases arising under the present law would be passed upon by joint board made up of representatives of the states in which any part of the interstate operation is conducted. Decisions by such boards could be appealed to the Interstate Commerce Commission.

All persons or firms engaged in or contemplating the operation of motor buses carrying passengers would be required to obtain from the Interstate Commerce Commission certificates to so operate. The bill provides that rates, fares and charges shall be "reasonable," and subject to such changes as are prescribed under existing law for travel by rail. Severe punishment in the form of fines and imprisonment is provided for the illegal operation of buses.

Ford Property Sold

DETROIT, Dec. 26—Approximately 12 acres of the Ford Motor Co.'s holding in Highland Park, fronting on the six-mile road, are being offered in parcels of various sizes, for industrial usage. About three acres of the property have already been sold. The acreage has a 1806 ft. frontage on the six-mile road and lies between the Grand Trunk Railroad on the west and Dequindre Avenue on the east. Tentative plans offer 12 factory sites, each fronting at least 100 ft. on the six-mile road, with the same frontage on the Detroit Terminal Railroad, whose tracks serve the property. Arthur H. Hill, Detroit, is the broker.

Steel Mills Have Reserve of Orders

Beginning of 1930 Will Find Backlogs Increased by Pre-Holiday Activity

NEW YORK, Dec. 26—Quite an encouraging number of small lot orders and numerous inquiries from parts manufacturers were received by sheet rollers before the Christmas holiday. Ton by ton, so to speak, backlogs are being added to, and most of the steel mills will have a fairly good reserve of orders on hand when 1930 operations begin. This week's production will be very light as the result of holiday shutdowns.

A good many producers would have liked to suspend operations throughout the remainder of the year, but quite a few of their orders call for prompt shipment, and all are eager to accommodate customers when it comes to speeding up deliveries. The recently announced merger of a number of Middle West steel mills, while financially a major consolidation, is not looked upon in the steel market as in any way altering the industry's set-up. The market leadership remains unchanged.

Further integration, more along the line of plants with a large production of semi-finished material seeking to obtain control of increased finishing capacity, would not come as a surprise to the trade. The market is rounding out the year in good shape in the matter of prices. While sheet bars, billets and slabs are almost generally quoted at $34 and the $35 quotation has virtually disappeared and while there has been quite a little shading of prices for black and blue annealed sheets and some other descriptions of finished steel, the market has weathered the period of most intensive dullness.

Blee Sees Aviation Progress in 1930

PHILADELPHIA, Dec. 23—Col. Harry H. Blee, director of aeronautic development of the Department of Commerce, predicted continued development for the aircraft industry in 1930, in an address before the Engineers' Club of Philadelphia. Readjustment that has been going on in the industry had the advantage of coming early in its existence, he said, and predicted that the readjustment would be a thing of the past before the aviation industry attained its majority.

Dealer Wins Tax Case

CHICAGO, Dec. 26—A dealer who purchased automobiles and removed the bodies therefrom, substituting other bodies which he had also purchased, was not subject to the tax of 5 per cent on manufacturers of automobiles, the Circuit Court of Appeals for the Seventh Circuit has just held.

The manufacturer's tax had been paid by the maker of the automobiles and also by the maker of the bodies. The amount of the tax on the dealer in this case was computed by applying the five per cent rate against the sales price, an allowance being made for the tax already paid on the bodies.

Stuebing-Cowan to Close

HOLYOKE, MASS., Dec. 23—The Stuebing-Cowan Co. is about to close its plant here for the manufacture of electric and hand-lift trucks and skid platforms and concentrate its production at Cincinnati. The plant here has employed about 75 persons. It was owned originally by the Cowan Truck Co., then consolidated with Stuebing, and recently was bought by the Yale & Towne Mfg. Co.

Financial Notes

Company	Announces
Airstocks, Inc.	dec. ex. div. $1 payable Jan. 2.
Bastian Blessing Co.	incr. annual div. rate from $2.50 to $3.00. Net income for year end. Nov. 30, $689,638 aft. chgs., Fed. taxes and empl. bonuses equal to $6.20 a share on av. amount of capital stock outstanding and to $5.99 a share on 115,000 shares outstanding on Nov. 30. Net income 1928 $464,661.
Borg-Warner Corp.	net 11 mos. earnings $7,155,803 after all chgs., incl. Fed. taxes, equiv. aft. minority interests, to $5.63 a share on 1,231,020 com. shares.
E. G. Budd Mfg. Co.	reg. quar div. 25c on com.; 1¾% on 7% pref.
Collins & Ailman Corp.	net 9 mos. profits aft. depr. & taxes $1,686,984, comp. with $1,311, 927 for same period 1928. Third quar. com. stock earnings was nearly 99% more than 3rd quar. 1928.
Fafnir Bearing Co.	reg. quar. div. 50c. Ex. div. 50c.
Fageol Motors Co.	dec. reg. semi-annual div. 35c on pref.
Firestone Tire & Rubber Co.	com. stock div. 40c. Reg. quar div 1½% on 6% cum. pref. series A.
Gemmer Mfg. Co.	reg. quar. div. 75c on class A; 30c on class B.
Kelsey-Hayes Wheel Corp.	reg. quar. div. $1.75.
Link-Belt Co.	net profits for 1929 estimate $3,400,000 aft. chgs. & taxes, would equal $4.40 a share, comp. with $4.21 a share for 1928.
Manning, Maxwell & Moore	quar. div. 1%.
Packard Motor Car Co.	div. 25c on 15,000,000 on no-par shares for 1st quar. fiscal year, beginning Jan. 1.
Sterling Motor Truck Co.	net income $401,331 for year end. Oct. 31, comp. with $205,712 for preceding 12 mos.
Youngstown Sheet & Tube	reported to be making appraisal for purchase of Acme Steel Co.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES.

NEW YORK, Dec. 26—On Dec. 13, President Hoover issued a statement to the effect that, on the average, Christmas buying this year is equal to that last year. There is less activity in the wholesale and jobbing trades; and the big industries are less active, but this is usual at this time of year.

NOVEMBER EMPLOYMENT

Employment during November decreased 3.1 per cent below that for the preceding month; and payrolls decreased 6.8 per cent, according to a report issued by the Bureau of Labor Statistics.

INDUSTRIAL ACTIVITY

Industrial activity during November, based on the consumption of electrical energy by 3600 manufacturing plants, was 8.7 per cent below that in October and 7.8 per cent below that a year ago.

FREIGHT CAR LOADINGS

Railway freight loadings for the week ended Dec. 7 totaled 936,825 cars which marks a decrease of 47,948 cars below those in the corresponding week last year and an increase of 59,149 cars above those in the corresponding week two years ago.

Professor Fisher's index of wholesale commodity prices for the week ended Dec. 21 stood at 92.8, as against 92.6 the week before and 92.7 two weeks before.

CRUDE OIL PRODUCTION

Average daily crude oil production in the United States for the week ended Dec. 14 was 2,622,250 bbl., as compared with 2,630,550 bbl. for the preceding week and 2,546,000 bbl. a year ago.

STOCK MARKET

The stock market last week suffered another setback, prices falling in the latter part of the week with great rapidity. With the exception of Friday, the day of the break, the volume of trading was not very heavy. Prices at the end of the week were generally lower, and in the case of some special issues the declines are large.

BROKERS' LOANS

Brokers' loans in New York City during the week ended Dec. 18 increased $39,000,000, bringing the total to $3,386,000,000, as against $5,111,000,000 a year ago.

FEDERAL RESERVE STATEMENT

The consolidated statement of the Federal Reserve banks for the week ended Dec. 18 showed decreases of $31,884,000 in holdings of discounted bills and of $12,429,000 in holdings of bills bought in the open market. There were increases of $146,331,000 in holdings of Government securities and of $11,232,000 in member bank reserve deposits.

Lanphier's Aero Company Producing Small Model

STAMFORD, CONN., Dec. 23—The Engineers Aircraft Corp. has started work here on the design and manufacture of a small sport and training plane.

Major Thomas Lanphier, formerly commanding the First Pursuit Squadron, is president.

The company was organized recently and has employed a staff of six engineers, graduates of the areonautical department of the Massachusetts Institute of Technology, to develop the plans and build the first plane.

The directors of the new corporation include, besides Major Lanphier, Colonel Henry Breckenridge, Charles T. Fisher, General Motors Corp., of Detroit; J. D. Permaine, of Detroit; J. F. Mendez and James M. Feelan, secretary and treasurer.

Colonel Charles A. Lindbergh visited the plant, which is in a section of the Mianus Diesel Engine factory, yesterday, driving up with Major Lanphier and Colonel Breckenridge. Colonel Lindbergh, it was learned, is not connected with the company, either directly or in an advisory capacity.

Studebaker Employment Up

SOUTH BEND, IND., Dec. 23—Seven thousand men today returned to work at the Studebaker Automobile plant, where a force of about 2000 has been on duty during the taking of the annual inventory and a lull in the motor car market. By February the company expects to add 2000 more, bringing the total to 11,000, it was announced.

Stanley Buys Tool Concerns

NEW BRITAIN, CONN., Dec. 18—The purchase was announced today of the Unishear Co., Inc., of New York, and the Crowe Safety Saw Co., Inc., of Cincinnati, by the Stanley Electric Tool Co., a subsidiary of the Stanley works. The businesses will be brought to this city. Stanley Electric Tool acquired recently the Ajax Hammer Company of New York and the L. R. Carter Company of Syracuse.

Ford Opens Berlin Salesroom

BERLIN, Dec. 18—The Ford Company, Ltd., today opened the first sales shop of its own on Unter den Linden. Many prominent Americans, including representatives of the American Embassy and Chamber of Commerce, attended the ceremony. The company's manager pointed out that already 70 per cent of the company's material was being bought in Germany and that it hoped to double its sales during 1930.

Packard Announces Dividend

DETROIT, Dec. 31—The board of directors of the Packard Motor Car Co., Thursday announced a dividend for the first quarter of the fiscal year beginning Jan. 1 of 25 cents per share on 15,000,000 common no-par value shares. The dividend is payable March 12, 1930, to stockholders of record at the close of business Feb. 15, 1930.

Liquid Fuel Used in Rocket Racer

BERLIN, Dec. 22—Max Valier, rocket car enthusiast, tested his recoil automobile with liquid fuel instead of rockets, on the Avus Speedway here today. The test was made without a hitch, but Valier failed to equal his record of 235 miles an hour made with the rockets.

Valier said the new fuel insured the driver's absolute control. The car is without springs. The driver's seat is in the centre, with four fuel containers in front of him and two behind.

The fuel used was liquid carbonic acid combined with benzine. The speed in today's test was estimated at about sixty-two miles an hour. The Junkers Co. has been reported as experimenting with the same fuel as a means of raising airplanes from the ground or water with a great saving in motive power.

Firestone Sees No Drop in Wage Levels, Report

BOSTON, Dec. 20—The Firestone Tire & Rubber Co. expects to maintain its present scale of wages, according to a statement issued by the Massachusetts State industrial commission, announcing receipt of the information from the tire company.

The Firestone company's letter was one of many received, the commission stated, in answer to an inquiry sent out a short time ago at the suggestion of Governor Frank G. Allen to large utility and industrial companies soliciting information to the effect that there would be no cut in the present scales of wages.

Six Aircraft Companies Plan $5,000,000 Merger

NEW YORK, Dec. 24—Negotiations are being carried on for a merger of six aircraft and engine-manufacturing companies with assets of more than $5,000,000 and the new Standard Aircraft Corp. of Paterson, N. J., as a nucleus. Reuben H. Reiffen, treasurer of the New Standard company, confirmed yesterday the reports of the negotiations. He said the purpose was to effect economies through concentration of manufacturing and sales efforts. No public financing would be required at present, he said.

The New Standard company specializes in the manufacture of training planes and five-place open cockpit machines. The other companies that may be included in the merger are manufacturers of mail, military-type and cabin planes, amphibians and engines, it was reported. The companies are being surveyed by engineers, while accountants are preparing financial statements.

The Alliance Aircraft Corp. of Alliance, Ohio, may be included in the combine.

Faldella Hopes to Show Italy Economy of Cars

NEW YORK, Dec. 23—Comm. Avv. Faldella, managing director of the Italian Fascist Automobile Dealers Association, is spending a few weeks in this country gaining information which can be used in convincing the Italian people that motor transportation is an economic factor of prosperity and is not purely a luxury. While he is here, Signor Faldella represents not only his own organization but the Italian Fascisti Automobile Manufacturers Association as well. Both these bodies have the recognition of the Fascist government.

Signor Faldella says that heretofore automobiles have been taxed as luxuries in Italy and because of the high tax and other high operating costs, based largely on taxes as well, the development of motor transportation in Italy has been materially retarded. It is hoped, however, by Premier Mussolini that the Italian people can be shown the economic advantages of motor transportation and that thereby taxes can be reduced, and the contributions to public welfare which will result from motor transportation will accrue to the Italian people.

Fiat to Buy Itala

PARIS, Dec. 9 (*Special*)—Arrangements have been completed for the purchase of the Itala Automobile Co., of Turin, by the Fiat organization. This move is in accordance with the Fiat policy of securing possession of the smaller Italian automobile factories, among those being absorbed during the last few years being Spa, Ceirano and Scat.

Buick Takes Distributorship

SPOKANE, Dec. 23—Sale of his Buick wholesale business throughout the Northwest to the Buick Motor Co. and immediate establishment of direct factory branches in this territory is announced by A. S. Eldridge of the Eldridge-Buick Co. from the Seattle headquarters.

Moore Regains Production

SPRINGFIELD, MASS., Dec. 23—The Moore Drop Forging Co., which has been running on a curtailed basis for several months, is rapidly getting back to normal. Substantial Ford orders are largely the means of this recovery, it is reported.

Indianapolis Plant to Reopen

INDIANAPOLIS, Dec. 24—Reopening of the Indianapolis factory branch of the Ford Motor Co. early in January, has been reported by George Steinmetz, manager.

Begins Marmon Body Output

DETROIT, Dec. 23—The Hayes Body Corp., of Grand Rapids, Mich., has announced that within the past 30 days it has started production on all bodies for the new Marmon line.

United Aircraft Exports Report Heavy Shipments

NEW YORK, Dec. 24—United Aircraft Exports, Inc., subsidiary of the United Aircraft and Transport Corp., announced that its exports and unfilled orders of the production of the United group in the six months ended on Oct. 31 amounted to approximately $1,210,000. Exports of United subsidiaries, before the formation last July of United Aircraft Exports, Inc., amounted to approximately $2,500,000. Export business of the group totaled $5,000,000 in 1929, according to Francis H. Love, president of the export company. The report was the first to be issued concerning the company's activities.

Export sales of the Chance Vought Corp., a United subsidiary, reached more than $1,000,000 in value during the year. These sales were made to Argentina, Cuba, Mexico and Peru, and approximately $500,000 worth of Vought Corsair planes were sold in Japan and China. The Vought company has completed a sales and manufacturing license agreement with the Nakajima Aircraft Works of Tokio, which will supply the Japanese market, according to Mr. Love.

During the year the Sikorsky Aviation Corp., another subsidiary of the United company, sold more than $1,400,000 worth of planes and parts for foreign operations, including twenty-two amphibian planes.

The Pratt & Whitney Aircraft Co., engine manufacturing subsidiary of United, exported $250,000 worth of engines during the three months ended on Oct. 31, while in the first six months of the year sales totaled about $500,000. Large export sales were reported also by the Stearman Aircraft Co., the Boeing Co. and the Hamilton Airplane Mfg. Co., other subsidiaries of United. According to the Department of Commerce, planes and parts valued at $4,344,000 were exported the first half of 1929.

Mr. Love declared that the introduction of the airplane into many foreign countries where distances are vast and transportation facilities are poor would forever preclude the possibility of railroad building on a large scale, particularly for passenger carrying. He said there appeared to be a "practically inexhaustible market for planes in South American countries."

Bus Taxes to Increase

WASHINGTON, Dec. 24—Special taxes imposed on common carrier motor buses in the United States during 1929 will exceed $25,000,000, an average of well over $500 each, according to a preliminary survey by the National Association of Motor Bus Operators, affiliated with the American Automobile Association. This statement is based on the normal increase in both registration and taxation and takes into consideration the fact that 46,000 common carrier buses paid a special tax bill of some $22,000,000 in 1928, an average of slightly over $478 per bus.

Fords' Gifts Praised by Prince of Wales

LONDON, Dec. 18—Henry Ford, Edsel Ford and the Ford Motor Company have given a total of $50,000 toward building a hospital in the populous new area northeast of London where the new Ford factory is being built.

The Prince of Wales announced the gift and paid tribute to the Fords' generosity. "We have just heard that my friend Henry Ford and his son Edsel are each giving $10,000 and that the Ford Motor Co. is contributing $25,000 and Sir Percival Perry, the chairman of the company, $5,000."

The new hospital will cost $1,250,000, of which $230,000 is already in hand.

U.S. Rolls-Royce Resumes After Temporary Lay-off

SPRINGFIELD, Dec. 24—Rolls-Royce of America, Inc., which sharply curtailed its production two months ago and released a large part of its working force in order to reduce its supply of cars for inventory-taking, is gradually taking on workers.

After a temporary drop in sales preceding the inventory, conditions are said to be better, with sales on the increase. The Rolls-Royce Phantom, embodying the increased speed and acceleration features recently adopted for the English car, has made an excellent sales record for the year. Throughout the summer and the early autumn the Springfield works were operated at the highest pitch in the history of the concern, according to its report.

Stewart Offers Truck With Optional Engine

BUFFALO, Dec. 23—A new 1-ton chassis, listing at $695 when equipped with a four-cylinder engine and $795 when equipped with a six, is the latest offering of the Stewart Motor Corp., Buffalo. The four-cylinder chassis is designated Model 30 and the six, Model 30X. Both are equipped with unit mounted plate clutches, four-speed transmissions, bevel gears and four-wheel Bendix brakes and are offered in a standard wheelbase of 130 in. and in specials of 120 and 140 in. Four types of stock bodies are built for these models, namely: metal panel, stake, express and canopy express.

Lubrication is by pressure. The cooling system includes a radiator made up of a cellular core and pressed steel shell, water pump and thermostat. The clutch is of the single plate type and is equipped with a vibration damper.

A Spicer 3-in. tubular drive-shaft equipped with metal Spicer joints is supplied on the 130-in. wheelbase size, while a three-joint shaft is furnished on the 140-in. wheelbase, the specifications of the truck show.

Standards Association is International Member

NEW YORK, Dec. 24—The American Standards Association, which sets up national specifications for industrial products, materials, machinery and tools, announced on Dec. 18, at its annual meeting at the Hotel Astor, that it had joined, as the eighteenth member organization, the International Standards Association, which has its headquarters at Zurich, Switzerland.

"The action of the American Standards Association will prove invaluable to our exporters to competitive foreign markets," W. J. Serrill of Philadelphia, president of the association, said, "by making available to them a knowledge of the requirements of foreign buyers who want products complying with their own national standards.

"Furthermore, when unessential differences between the national standards are eliminated, our manufacturers will be enabled to apply the principles of mass production to their exports to a far greater extent than at present for many of their products. Our competitive position is certain to be strengthened."

At the present time American exporters are making extensive use, through the American Standards Association, of information concerning foreign industrial standards.

Among the standards approved by the association in the past year are the first national standard for radio, fixing the dimensions governing the fit of four-pin vacuum tube bases and the arrangement of terminals, a new standard of regulations for electric wiring and apparatus in relation to the fire hazard and the code for protection against lightning.

The association is now working on specifications for household refrigerators, sheets and sheeting and blankets, all three at the request of the American Home Economics Association. All standards, it was explained, are set up on the basis of a consensus of opinion of competent authorities, and their acceptance is purely voluntary.

Maintenance Group Meets

WASHINGTON, Dec. 23—The committee on the Maintenance of the Motor Vehicle of the National Conference on Street and Highway Safety, at a meeting at the Chamber of Commerce of the United States on Dec. 16, adopted a resolution advocating repairing and overhauling of automobiles during the slack winter months, not only to promote safety on the highways, but at the same time to stabilize employment. The committee recommended to Secretary of Commerce R. P. Lamont that the suggestion be brought to the attention of the motoring public and that the various highway safety officials be requested to give it publicity.

Director William Candler, Atlanta, presided at the meeting as chairman of the committee. Several members of the committee presented written memoranda on the points brought out at a previous meeting.

Men of the Industry and What They Are Doing

Earl BeSaw Promoted

Earl W. BeSaw has been appointed president of the Canadian Firestone Tire and Rubber Co., according to an announcement from the company. Mr. Be Saw has been vice-president and general manager of the Canadian company since Dec., 1922, after serving as general sales manager of the American company. For a time he was vice-president of the Oldfield Tire Co., a Firestone subsidiary.

Howard is Advanced

Announcement of the advancement of John M. Howard from the position of advertising manager of the General Motors Truck Corp. to the post of assistant sales manager directing sales extension has been made. **H. T. DeHart**, formerly an assistant in the department, becomes advertising and sales promotion manager.

Mr. Howard has been affiliated with the General Motors Truck Corp. since March, 1928, and has been identified with the automotive industry in selling and advertising for the past 15 years. Mr. DeHart came to the General Motors Truck Corp. last March from the Reo Motor Car Co. at Lansing, where he had been advertising manager for a number of years.

Olds Executives Shifted

J. J. Carter

LANSING, Dec. 24—The appointment of G. H. Bernard as factory manager of the Olds Motor Works, succeeding J. J. Carter, who will accompany I. J. Reuter to Europe, as stated in last week's *Automotive Industries*, has been announced. Mr. Reuter will assume direction of the Opel Motor Works, Russelsheim, Germany, with Mr. Carter as his assistant.

D. S. Eddins

In his statement of the succession of D. S. Eddins to the position of vice-president and general manager of Olds Motor Works, Mr. Reuter said, "General Motors Corporation has called upon me to take over the responsibility for the operation of Adam Opel, A. G., a General Motors unit located at Russelsheim, Germany. The fulfillment of this assignment requires that I leave for Germany on Dec. 26. Though Mr. D. S. Eddins will succeed me as general manager of Olds Motor Works, my assignment to the Adam Opel organization is not of a permanent character and I shall, therefore, continue to be president of Olds Motor Works.

J. T. Collins

G. H. Bernard

"J. J. Carter, factory manager of Olds Motor Works, shall accompany me to Germany to assist in the operation of the Adam Opel organization. G. H. Bernard, formerly assistant factory manager of Olds Motor Works, has been advanced to the position of factory manager, succeeding Mr. Carter."

J. T. Collins' appointment as general sales manager was announced by D. S. Eddins, vice-president and general manager. Mr. Collins succeeds Mr. Eddins in the position of general sales manager.

Briner Joins Maremont

R. F. Briner has been appointed sales-promotion manager of the Maremont Mfg. Co., Chicago manufacturer of automobile springs, according to an announcement from the company. Mr. Briner has been associated with automotive parts companies for 15 years.

Fritz von Opel Arrives

Fritz von Opel, designer of rocket-propelled automobiles and airplanes, arrived this week on the North German Lloyd Liner Columbus, accompanied by Mrs. von Opel.

Tinius Olsen Resigns

Tinius Olsen has resigned as president of the Tinius Olsen Testing Machine Co., Philadelphia, and has been succeeded by Thorsten Y. Olsen, vice-president and treasurer.

Reichel Made Sales Manager

The Jordan Motor Car Co. has announced the appointment of R. C. Reichel as sales manager to succeed L. F. Murphy who has joined Jordan Distributors, Inc., as vice-president and general manager of the unit located in New York City. Mr. Reichel, who was originally with the United States Steel Corp., spent 22 years in the automobile industry with Buick, Chalmers and Chrysler before coming to Jordan.

Olds Appoints Ackerman

Announcement of the establishment of a new sales region to be known as the Great Lakes region and the appointment of Frank J. Ackerman as regional manager is announced by D. S. Eddins, vice-president and general manager of Olds Motor Works. Headquarters of the new region will be maintained in the new administration building of Olds Motor Works, Lansing, Mich.

England Leaves Stearns

W. E. England, for nine and one-half years chief engineer of the F. B. Stearns Co., Cleveland, has severed his connection with the company. Mr. England has been associated with the passenger car industry since 1911. At present he is chairman of the Cleveland Section, Society of Automotive Engineers. His future plans have not been announced.

Evans Appoints Norton

E. S. Evans, president of the Detroit Aircraft Corp., has announced the appointment of C. R. Norton as Eastern sales representative of the company. Mr. Norton has recently been associated with Eastern aircraft companies. His offices will be located in New York.

Willis Made Sales Manager

Ross E. Willis, who has been connected with the Ready-Power Company of Detroit in a sales capacity since 1926, has been appointed sales manager. The Ready-Power Company manufactures power units for industrial trucks. Mr. Willis previously was a member of the Detroit sales organization of the Baker-Raulang Co.

Ross E. Willis

December Construction Gains Over Last Year

PHILADELPHIA, Dec. 26—Building construction announced by automobile and parts and accessory manufacturers is holding well above the totals for December, 1928, as the last month of the year draws to a close. Contemplated construction for the first month or two of 1930 is well in excess of actual building done in the same period of last year, and several large building programs announced during the past month will greatly increase the total expenditure during the first quarter of next year. Among the announcements made this week are:

Battery Operating Co., New York, plans $100,000 service and repair garage. Julius Eckmann, architect.

I. Kallich, Brooklyn architect, will soon take bids for $130,000 service and repair garage.

Roy W. and Thornton D. Whipple, Binghamton, N. Y., have organized Whipple's, Inc., to operate plant for manufacturing automobile parts and accessories. Company incorporated for $400,000.

Wright-Hibbard Industrial Electric Truck Co., Inc., Phelps, N. Y., will install $50,000 worth of machinery for increasing production.

Gimbel Bros. (department store), Philadelphia, soon to take bids on $170,000 service and reconditioning shop for delivery fleet of trucks.

G. & O. Mfg. Co., New Haven, Conn., has asked bids on $60,000 addition for manufacturing airplane engine radiators.

Hayes Body Corp., Grand Rapids, Mich., plans $250,000 addition for stamping metal bodies.

F. G. Schenuit Rubber Co., Baltimore (automobile tires), will soon award contract for $100,000 rebuilding project for manufacturing plant.

Tyler Resilient Tire & Tube Corp., Cumberland, Md., contemplating new $100,000 plant for manufacturing patented automobile tire. Sixty acres of land have been purchased.

Anderson, S. C., City Council has authorized expenditure of $75,000 for hangars and repair shop at newly acquired municipal airport, formerly Welch Aircraft Co. field.

Republic Stamping & Enameling Co., Canton, Ohio, to spend $85,000 for addition to manufacturing plant and equipment.

U. S. Army Air Corps, Fairfield Air Depot, Fairfield, Ohio (near Dayton), soon to ask bids on $100,000 airplane assembling plant and $150,000 machine and reconditioning shop.

Rubber Market Inactive

NEW YORK, Dec. 23—Year-end lack of activity on the part of tire manufacturers has resulted in an almost complete cessation of activity in the crude rubber market. The market sag in prices, according to F. R. Henderson Corp., is due to the fact that most of the manufacturers close down completely for inventory for the last few days of the year and as a result prices dropped Dec. 20 to a new low of 15.50 for December positions. Considerable increased firmness is anticipated for the holidays. Stocks of crude rubber in London decreased last week to a total of 53,180 tons while Liverpool stocks continued to increase to 18,263 tons. Declared production of Federated Malay States, Straits Settlements, Johore and Kedab from estates of 100 acres or more during November was placed at 19,785 tons.

Pines Expects Increase

CHICAGO, Dec. 23—Sales and shipments of the Pines Winterfront Co., of Chicago, for the first days of this month exceeded the total for December, 1928, J. F. Raleigh, president, said today.

"The outlook for us is exceptionally good for the next several months," Mr. Raleigh said. "The huge 1930 production programs of automobile companies are an assurance to us that the coming year will bring substantial increases in the sales, even above the gains we enjoyed in 1929."

Cartel May Result From Prague Meeting

PRAGUE, Dec. 19—The possibility of a European automobile manufacturers' cartel to combat the rapidly growing importation of American-made cars is seen in the announcement of a meeting of the executive committee of the European automobile industry to take place in Prague about the middle of January. The immediate business before the meeting is the raising of production up to the limit of the home market quotas, but pressure for the formation of the cartel is being brought by German and Czechoslovak automobile manufacturers, it is said.

Graham-Paige Prices Raised

DETROIT, Dec. 23—Effective Jan. 1, there will be an increase in the price of all Graham-Paige cars. In making this announcement, Joseph B. Graham, president of the Graham-Paige Motors Corp., said that during 1930 the corporation will adopt a policy of strict control of production and shipment to dealers. By shipping cars only as required for immediate wholesale and retail delivery and by regulating production during the off periods to build up a reasonable reserve stock to meet peak demand, it is hoped to provide steady employment for all Graham-Paige workers.

Olds Prices Increased

LANSING, Dec. 26—Effective with new car models, prices of the Oldsmobile six will be increased $20 on 2-door and 4-door sedans, the sport coupe, business coupe, and phaeton. The former landau sedan will be known as the Patrician sedan in the new line, and will be priced at $1,060, an increase of $25. The convertible roadster will be sold at $995 as heretofore, and the standard roadster has been dropped. Corresponding price increases have been made on the special and de luxe series of the Oldsmobile line.

Chrysler Prices Raised

DETROIT, Dec. 23—The Chrysler Sales Corp. has announced increased list prices effective Jan. 1. To maintain the established quality of the company's products, all Chrysler "77," "70," "66" and Imperial cars, it was announced, will be advanced in list prices from $20 to $100, depending upon chassis model and body styles.

Indian Motocycle Co. Doubles Capital Stock

SPRINGFIELD, MASS., Dec. 23—Stockholders of the Indian Motocycle Co. at a largely attended meeting here last week voted to increase the common stock of the company from the 100,000 shares of no par value now authorized, to 200,000 shares, as recommended by the board of directors. A meeting of the directors followed.

In a recent letter to stockholders, Norman T. Bolles, president of the company, stated that the above move was made necessary by losses of $1,250,000 incurred during the past 16 months, due to changes in manufacturing and sales policies. During the 16 months period the company has undergone three changes in management, consequent upon fluctuations of the stock market.

"The production of motorcycles by your company has reached, in the year 1929, the lowest point since the incorporation of the original Hendee Manufacturing Company. This decrease in production has occurred during a time when production in the United States has been maintained at a normal average and with the world production showing a substantial gain over previous years," the statement said.

Louis H. Saunders

DETROIT, Dec. 23—Louis H. Saunders, 43 years old, president of the Saunders-Buick company of Birmingham, Mich., died Wednesday, Dec. 18, at the home of his mother, Mrs. N. Elizabeth Saunders, in Lansing. His mother had died Tuesday and he had left his home the same evening to attend her funeral. He was found dead in bed Wednesday morning.

For five years Mr. Saunders had been treasurer of the Michigan Automotive Trade Association and for four years he was a director of the Detroit Auto Dealers' Association. In 1925 he was president of that organization. In 1922 he was appointed sales manager for the Reo company in Detroit, and later headed his own organization.

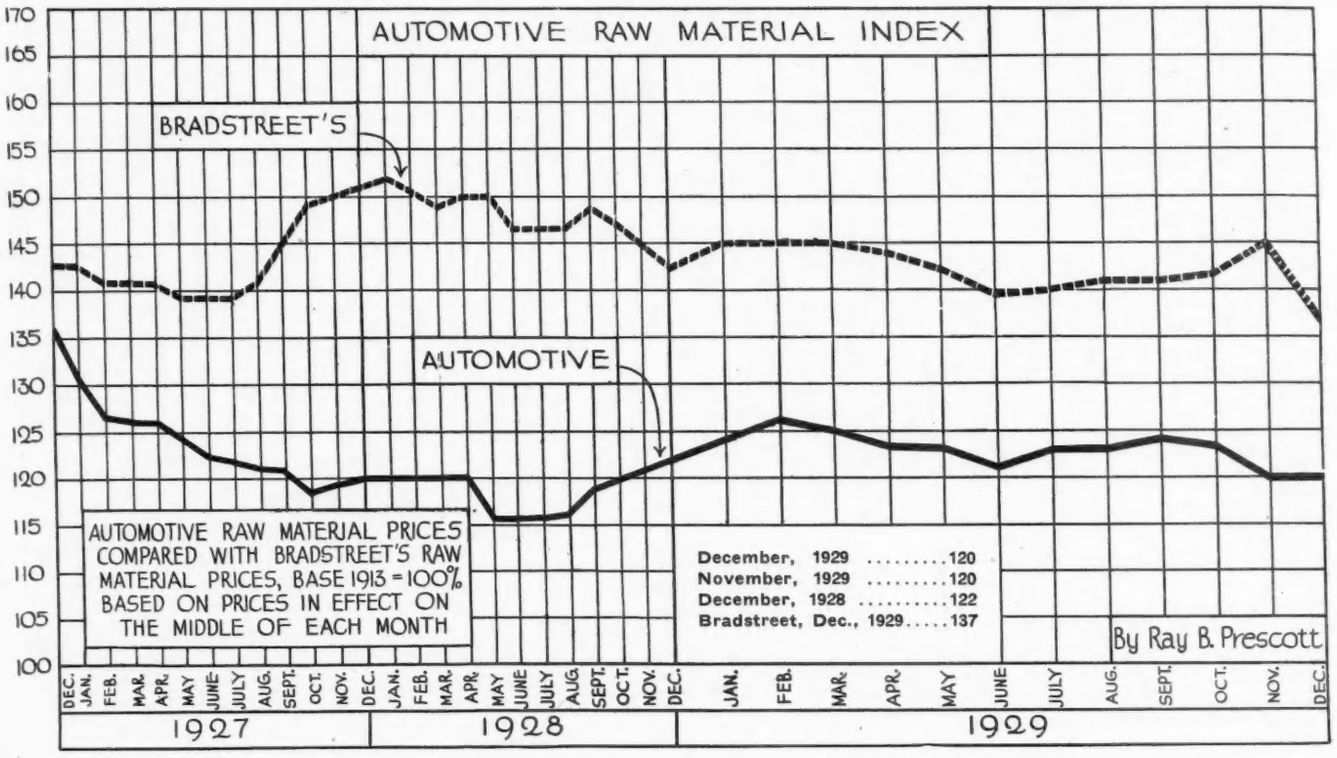
Paramount Cab Elects

NEW YORK, Dec. 23—Paramount Cab Corp., at its annual meeting, reelected the following officers and directors: A. S. Freed, president; A. J. Freed, vice-president; N. D. Light, vice-president; L. F. Kettle, vice-president; H. O. Sandberg, vice-president; F. M. Wohl, treasurer; C. E. Weldon, secretary, and E. H. Rodney and E. P. Burnham, directors.

Has Large Export Orders

NEW YORK, Dec. 23—United Aircraft Exports, Inc., subsidiary of United Aircraft and Transport Corp., reports exports and unfilled orders of United group during the three months ended Oct. 31 of approximately $1,210,000. Exports of this company during the first six months of its existence amounted to $2,500,000.

Raw Material Index Levels Off During December



Webb Describes Catapult

NEW YORK, Dec. 23—That automatic catapulting and arresting devices for airplanes in transport use, similar to devices used by the navy on aircraft carriers, would have a number of drawbacks was the consensus arrived at by the members of the Metropoitan section of the Society of Automotive Engineers at their regular monthly meeting held at the American Women's Association Building here last Wednesday. Lieut. L. D. Webb, formerly chief aviation repair officer on the U.S.S. Lexington, and now of the Navy Department's Bureau of Aeronautics at Washington, was the principal speaker of the evening and described automatic starting and stopping devices in use by the navy from early times up to the present.

Tariff Hearings to Resume

WASHINGTON, Dec. 23—The hearings on the iron and steel schedule of the Canadian tariff, held at Ottawa by the Advisory Board on Tariff and Taxation, have adjourned with the announcement of additional hearings on Jan. 22 for further representations on all schedules pertaining to automobiles and parts, according to a cablegram received by the Department of Commerce from Commercial Attache Lynn W. Meekins, Ottawa.

Barrett-Cravens Co. Bought

CHICAGO, Dec. 23—Purchase of the Barrett-Cravens Co., manufacturer of lift-trucks for industrial handling, by the Walker Vehicle Co., of Chicago, has been announced by the former company. The Walker Vehicle Co. is a subsidiary of the Commonwealth Edison Co., Chicago, and with the purchase of the capital stock of the Barrett-Cravens Co., is linked with the Automotic Transportation Co., another manufacturer of automatic handling equipment.

Study Riding Fatigue

NEW YORK, Dec. 23—Experiments to measure fatigue caused by automobile riding are being conducted by the Society of Automotive Engineers in the research laboratory to determine possible effects of various types of spring suspension, shock absorbers and other comfort-giving components. These experiments, which are being conducted by Dr. Fred A. Moss, head of the Department of Psychology of George Washington University, Washington, D. C., have been in progress for some time but have only recently shown such results as to justify further study, in Dr. Moss's opinion.

Champion Gets Austin Order

TOLEDO, Dec. 23—The Champion Spark Plug Co. announced here today that it has secured the contract for furnishing spark plugs for the new Austin car to be built at Butler, Pa. It is the fourth Toledo equipment company to share in Austin contracts.

Glider Prices Reduced

DETROIT, Dec. 23—At a meeting of the Board of Directors of the Detroit Aircraft Corp. it was decided that the price of gliders produced by the corporation would be reduced from $585 to $435, according to the company.

Forms Export Division

DETROIT, Dec. 23—E. S. Evans, president of the Detroit Aircraft Corp., has announced the formation of the Detroit Aircraft Export Corp. Division. This new division was formed for the purpose of handling export sales in South and Central America, China, Japan, Australia, New Zealand and South Africa. I. J. Miranda, who has had many years' experience in the export field, now has an organized force of resident field men in all the principal cities of these countries, as well as 82 sub-dealers.

G. M. Truck Men to Meet

DETROIT, Dec. 23—A meeting of the members of the field staff of General Motors Truck Co. who have won recognition for "distinguished service" in the field of commercial transportation was held in Detroit and Pontiac, Mich., during the week of Dec. 15. Some 75 of the company's branch and sub-branch managers, distributors and sales managers from all parts of the country were present.

Ford Assembly Plant Adds

PORTLAND, Dec. 23—Shortly after Jan. 1, the number of employees at the local Ford plant will be increased to 600, and they will be under the new wage schedule of $7 minimum for an eight-hour day. According to C. A. Bullwinkle, manager, $75,000 has been expended on the Portland plant recently, the bulk of it on a new department for the building, trim and painting of sedan and coupe bodies.

Automotive Executives Get Advisory Posts

WASHINGTON, Dec. 27—Automotive representation has been given to the advisory committee of approximately 100 business executives selected by Chairman Julius Barnes of the National Business Survey Conference to aid in carrying out the program of the Chamber of Commerce of the United States to maintain business and employment stability. The survey was undertaken at the request of President Hoover.

The advisory committee includes the names of J. M. McComb, New York, Motor and Equipment Association; J. R. Histed, Chicago, National Automobile Dealers Association; Frank A. Seiberling, Barberton, Ohio, Rubber Manufacturers Association, and F. B. Rentschler, New York, Aeronautical Chamber of Commerce of America, Inc. These executives will constitute the Business Survey Conference Committee, and will report to the previously appointed executive committee of which Alvan Macauley, president, National Automobile Chamber of Commerce, and president of the Packard Motor Co., is a member.

Tire Production Reported

NEW YORK, Dec. 23—Tire production during October in the United States is estimated by the Rubber Manufacturers Association at 4,918,912 casings and 5,309,711 inner tubes. Shipments of casings during the month are estimated at 4,959,676, and shipments of tubes estimated at 5,001,437.

Inventories as of Oct. 31 are estimated at 12,844,538 casings and 13,655,868 inner tubes. These figures are based on reports of manufacturers who produce approximately 75 per cent of the total of the United States.

Court of Claims Defines "Accessory"

WASHINGTON, Dec. 23—The Court of Claims of the United States in a decision handed down Dec. 2 defined the word accessory as applied to automobiles as follows: "An accessory for an automobile truck, automobile wagon, other automobile, or motorcycle, is any article designed to be attached to or used in connection with such vehicle to add to its utility or ornamentation, and which is primarily adapted for use in connection with such vehicle, whether or not essential to its operation."

Fisher Plant to Open

SEATTLE, Dec. 23—The new plant of the Fisher Body Corp. will be opened here early in January for the manufacture of wood parts for automobile bodies. Between 400 and 500 men will be employed. Parts made will be shipped to 30 body assembly plants of the company.

Commercial Gets Contracts

BALTIMORE, Dec. 23—The Commercial Credit Co. announced today the signing of exclusive contracts with the Stewart Motor Corp. of Buffalo and the Motor Wheel Corp. of Lansing, Mich., for the wholesale and retail time sale financing of the products of these manufacturers.

Penna. S.A.E. Hears Papers on Aeronautics

PHILADELPHIA, Dec. 23—At the December meeting of the S.A.E. Pennsylvania Section, held at the Philadelphia Automobile Trade Association rooms Dec. 19, talks on three different aeronautic subjects were given by as many speakers. Safety in Flight was the subject of an address by W. Laurence LePage, assistant to the vice-president of Pitcairn Aviation, Inc. Mr. LePage discussed principally the fundamentals underlying mechanical flight, stating that a thorough comprehension of these principles would remove the skepticism with which flying is still being regarded by a large section of the public.

E. B. Neil, manager of the research department of Chilton Class Journal Co., presented a paper on Geared Engines, which is reproduced in abstract elsewhere in this issue. A talk on Parachute Jumping was given by Mr. Ford of Irving Air Chute Co.

Raise French Air Budget

WASHINGTON, Dec. 23—The 1930 budget for the French Ministry of Air totals 2,100,000,000 francs (approximately $84,000,000), as presented to the finance committee of the Chamber of Deputies. This committee reduced the total by about 60,000,000 francs ($2,400,000), but some of the items stricken out or pared down may be restored before the budget is finally voted, according to a report from Automotive Trade Commissioner W. L. Finger, Paris, France. The increase over this year is approximately 200,000,000 francs.

New Cars Financed During First Ten Months Were 2,982,223

WASHINGTON, Dec. 24—The number of automobiles financed during the first ten months of the current year, as reported to the Department of Commerce by 387 automobile-financing organizations, was 2,982,223, on which $1,391,223,828 was advanced. Data are also shown for 280 identical concerns which reported both for 1928 and 1929. This summary will be subject to revision in subsequent issues as reports are received from additional concerns. Detailed statistics are given below, by months, new cars and used cars shown separately. Some of the smaller firms found it impossible to segregate their operations; their totals are shown in the unclassified group.

	Total		New Cars Financed		Used Cars Financed		Unclassified	
1929	Number of Cars	Volume in Dollars	Number of Cars	Volume in Dollars	Number of Cars	Volume in Dollars	Number of Cars	Volume in Dollars
January	147,008	71,939,872	76,157	47,188,573	66,400	22,702,351	4,451	2,048,948
February	177,960	85,263,846	101,712	60,485,230	71,520	22,597,517	4,728	2,181,099
March	290,422	136,287,410	164,648	96,505,505	118,281	36,526,060	7,493	3,255,845
April	363,339	168,844,566	203,224	119,630,526	151,498	45,381,285	8,617	3,832,755
May	381,810	176,227,801	210,303	123,691,554	163,500	49,048,413	8,007	3,487,834
June	369,968	171,883,530	202,457	120,771,728	160,736	48,116,003	6,775	2,995,799
July	370,195	172,234,687	205,244	121,893,605	157,440	47,121,084	7,512	3,219,998
August	336,560	156,088,976	184,414	109,022,109	145,734	44,202,897	6,412	2,863,970
September	283,922	132,092,298	154,446	91,569,577	123,421	37,754,909	6,055	2,767,812
October	261,039	120,360,842	128,087	77,789,583	127,231	39,061,033	5,721	3,510,226
Total (10 mos.)	2,982,223	1,391,223,828	1,630,692	968,547,990	1,285,761	392,511,552	65,770	30,164,286

Identical Concerns

	Total		New Cars Financed		Used Cars Financed		Unclassified	
1929	Number of Cars	Volume in Dollars	Number of Cars	Volume in Dollars	Number of Cars	Volume in Dollars	Number of Cars	Volume in Dollars
July	346,224	159,131,474	195,933	113,980,860	146,881	43,653,997	3,410	1,496,617
August	314,392	145,999,248	173,136	102,952,339	137,609	41,444,862	3,647	1,602,047
September	270,003	125,294,873	149,089	87,913,344	117,390	35,814,987	3,524	1,566,542
October	248,913	113,907,762	123,137	75,011,989	121,717	37,296,493	4,059	1,599,280
Total (4 mos.)	1,179,532	544,333,357	641,295	379,858,532	523,597	158,210,339	14,640	6,264,486
1928								
July	225,445	108,933,149	118,269	73,807,095	91,463	27,079,848	15,713	8,046,206
August	221,730	108,170,901	118,807	74,952,849	92,384	27,934,137	10,539	5,283,915
September	190,132	94,325,612	83,034	62,421,214	93,447	24,864,252	13,651	7,040,146
October	193,728	94,288,357	95,637	61,112,663	84,719	26,211,715	13,372	6,963,979
Total (4 mos.)	831,035	405,718,019	415,747	272,293,821	362,013	106,089,952	53,275	27,334,246

Martin-Parry Contracts to Deliver Whole Output

YORK, PA., Dec. 23—An immediate order for the production by the Martin-Parry Corporation, York, Pa., of 450 automobile trailers has been placed by N. H. Timmins, Inc., Montreal, Canada, and a contract has been signed for handling the entire production of the York plant for the next five years by the Canadian firm.

Frederick M. Small, president of Martin-Parry, in announcing the two contracts, stated that the new trailers will be of the two-wheeled type, revolutionary in design and completely equipped for housekeeping by tourists. Carleton Brown, vice-president of the Split Coach Motor Corporation, Montreal, is at the York plant handling the engineering end of the production of the first trailers. The trailers will be placed on exhibit at the Jan. 4-11 New York National auto show.

Two Planes Left in Contest

NEW YORK, Dec. 23—Of 27 airplanes originally entered in the safe aircraft competition of The Daniel Guggenheim Fund for the Promotion of Aeronautics, only the Curtiss entry and the Handley-Page entry now remain as contestants for the principal prize of $100,000. The Curtiss entry has completed 17 of the 18 qualifying tests and the Handley-Page entry has finished 14 of these tests.

Make Endurance Record

CINCINNATI, Dec. 23—A 500-hr. non-stop run, establishing what is claimed to be a world automobile record for a half-mile dirt track, was completed recently by Ralph Ormsby, Jr., and Henry Schlosser of Cincinnati at the Cincinnati Hamilton Speedway. These drivers, who did not leave their Model A Ford roadster at any time in the course of 500 hr., covered 14,540 miles.

"Automotive Industries" Show Week Calendar

NEW YORK SHOW WEEK EVENTS

Jan. 6—Oakland Motor Car Co. Banquet. 6:30. Pennsylvania Hotel
Jan. 6—Willys-Overland. Luncheon. Biltmore Hotel
Jan. 7—Graham-Paige. Luncheon. 1:00 Biltmore Hotel
Jan. 7—N.A.C.C. Banquet. Commodore Hotel
Jan. 8—Motor & Equipment Assn. Banquet. Astor Hotel
Jan. 8—Automotive Electric Assn. (Sales & Service Convention) Astor Hotel
Jan. 9—Willys-Overland. Banquet. 6:30. Commodore Hotel
Jan. 9—Overseas Auto. Club. Dinner. 6:30. Astor Hotel

CHICAGO SHOW WEEK EVENTS

Jan. 25—Studebaker Corp. Banquet. Palmer House
Jan. 28-29—Automotive Electric Assn. Convention. Stevens Hotel
Jan. 28—Graham-Paige Luncheon. 1:00. Palmer House
Jan. 28—Oakland Motor Co. Banquet. 6:30. Palmer House
Jan. 29—Willys-Overland. Banquet. 6:30. Palmer House

Note: This calender, with subsequent additions which may be made by the organizations concerned, will be reprinted in the Jan. 4 issue. In order to appear in that issue, additions or corrections must reach the News Editor, not later than Thursday, Jan. 2.

England May Change Code

LONDON, Dec. 10—Removal of all speed restrictions from passenger automobiles, and stricter regulation of motor carrier traffic are provided for in a new bill introduced by the Ministry of Transport, which has passed its second formal reading in the House of Lords. The bill is designed to modernize the whole of existing English legislation relating to the use and construction of automobiles, and contains, with very few alterations, the recommendations of the Royal Commission on road traffic which were summarized in *Automotive Industries* for Aug. 17.

Aircraft Company Formed by Uppercu and Burnelli

NEW YORK, Dec. 23—The Uppercu-Burnelli Aircraft Corp. has been incorporated in Delaware with a capital of 1,000,000 shares of no par value under the sponsorship of Inglis M. Uppercu, president of the Uppercu-Cadillac Co., New York Cadillac distributor, and Vincent J. Burnelli, aeronautical designer and engineer. The company will take over patents on new types of planes, owned by Mr. Burnelli, who plans to manufacture 12-passenger tri-motored transport planes of his design. Mr. Burnelli's patents cover an airfoil contour fuselage, adding to the lifting capacity of the plane.

Alfa-Romeo Making Racers

PARIS, Dec. 9 *(Special)*—On the personal intervention of Premier Mussolini, the Alfa-Romeo Co. has started construction of 20 straight-eight supercharged racing cars of 146 cu. in piston displacement, which will be put into the hands of Italian drivers and entered in races both in Italy and abroad in order to enhance Italian prestige. The cars will be of the same general design as the 122 cu. in. Alfa-Romeos built five years ago and which raced for the first time in the European Grand Prix at Lyons, where they won. Two of these cars are still in service, one of them winning at Monza, last September, in a race having Leon Duray among the starters.

Prohibit Additional Taxicabs

WILMINGTON, DEL., Dec. 23—The Directors of the Street and Sewer Department, who have exclusive jurisdiction over all streets, have announced that no more taxicab companies than those now doing business here will be licensed to use the streets until further notice. Furthermore, no additional cabs will be permitted except as replacements.

Calendar of Coming Events

SHOWS

New York National.....Jan. 4-11
East Orange, N. J., Automobile ...Jan. 8-11
Newark (N. J.) Automobile Show..Jan. 11-18
Philadelphia, Automobile .....Jan. 11-18
Buffalo, Automobile .....Jan. 11-18
Milwaukee Automobile Show ....Jan. 11-18
Toronto, Automobile .....Jan. 11-18
Cincinnati, Automobile .....Jan. 12-18
Boston, Automobile .....Jan. 18-25
Detroit, Automobile .....Jan. 18-25
Baltimore, Automobile .....Jan. 18-25
Harrisburg, Automobile .....Jan. 18-25
Louisville, Automobile .....Jan. 18-25
Hartford, Automobile .....Jan. 18-25
Pittsburgh, Pa., Automobile .....Jan. 18-25
Brooklyn, Automobile .....Jan. 18-25
Montreal, Automobile .....Jan. 18-25
Louisville, Automobile .....Jan. 18-25
Los Angeles, Automobile .....Jan. 18-26
Rochester, Automobile .....Jan. 20-25
Wilmington, Del., Automobile ...Jan. 20-25
Chicago National Coliseum..Jan. 25-Feb. 1
Washington, D. C., Automobile Jan. 25-Feb. 1
Cleveland Automobile Show..Jan. 25-Feb. 1
Copenhagen Trucks, etc. ....Jan. 25-Feb. 2
Columbus, Automobile .....Jan. 26-Feb. 1
Portland, Me., Automobile...Jan. 27-Feb. 1
Wilkes-Barre, Automobile ...Jan. 27-Feb. 1
San Francisco, Cal., Automobile..Feb. 1-8
Minneapolis-St. Paul, Automobile..Feb. 1-8
Toledo, Ohio, Automobile .....Feb. 3-8
Wichita, Automobile .....Feb. 3-8
Cumberland, Automobile .....Feb. 3-8
Syracuse, Automobile .....Feb. 3-8
Ottawa, Automobile .....Feb. 3-8
Peoria, Automobile .....Feb. 4-8
St. Louis, Automobile .....Feb. 4-9
Cincinnati, Aircraft .....Feb. 8-14
Albany, Automobile .....Feb. 8-15
Akron, Automobile .....Feb. 8-15
Kansas City, Automobile .....Feb. 8-15
New York, American Legion, Aviation .....Feb. 9-15
Denver, Automobile .....Feb. 10-15
Indianapolis, Automobile .....Feb. 10-15
Sheboygan, Automobile .....Feb. 10-16
Mankato, Automobile .....Feb. 12-15
Providence, Automobile .....Feb. 14-22
Canton, Automobile .....Feb. 15-22
Omaha, Automobile .....Feb. 17-22
Copenhagen, Automobile .....Feb. 21
Camden, N. J., Automobile..Feb. 24-Mar. 1
Des Moines, Automobile ....Feb. 24-Mar. 1
Seattle, Wash., Automobile..Feb. 25-Mar. 2
Detroit (All-American Aircraft)..April 5-13
Asbury Park, N. J., Automobile..April 7-12

CONVENTIONS

National Automobile Dealers Association, New York City .....Jan. 6
American Road Bldrs. Assn., Atlantic City .....Jan. 11-18
Equipment for Motor Trucks, Inc., Atlantic City (during road show) Jan. 15
American Institute Electrical Engineers, New York .....Jan. 27-31
National Automotive Dealers Association, Chicago .....Jan. 27-28
Ohio Assn. of Commercial Haulers, Cleveland .....Jan. 30-31
Southwest Road Show and School, Wichita .....Feb. 25-28
American Society Mechanical Engineers, Fiftieth Anniversary Celebration:
New York .....April 5
Hoboken, N. J. .....April 7
Washington, D. C. .....April 8-9

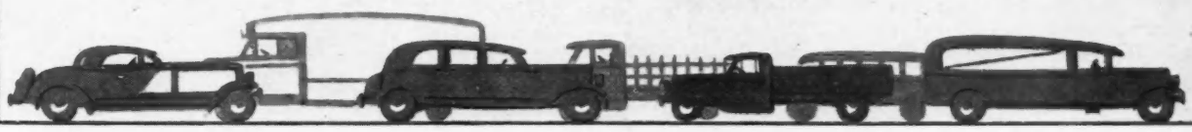
S. A. E.

Annual Meeting, Detroit.....Jan. 21-24

SALONS

Hotel Biltmore, Los Angeles.....Feb. 8-15
Palace Hotel, San Francisco, Feb. 22-Mar. 1

ELECTROLOCK ON 74.9% OF ALL CARS AND TRUCKS PRODUCED

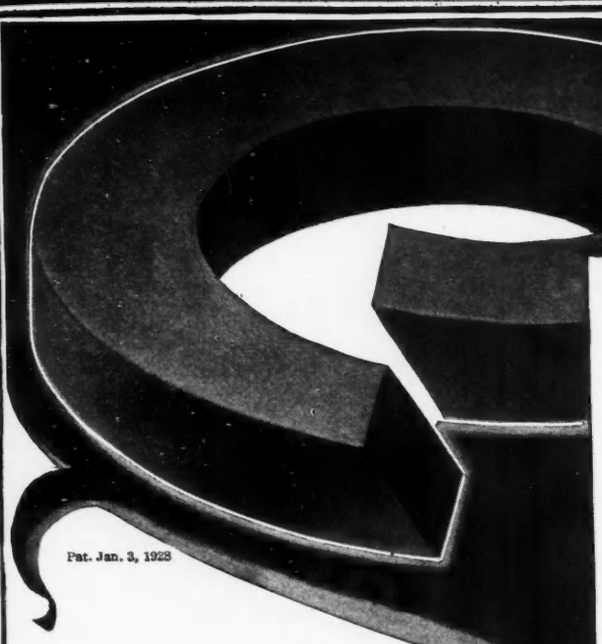


Electrolock
YOU CAN'T FORGET TO LOCK IT

The official list of cars and trucks produced in the United States and Canada during the first ten months of 1929 (latest available figures) indicates that ELECTROLOCK is standard equipment on 74.9%—proving that nothing succeeds like supplying the Industry with a lock that pleases everybody concerned—the vehicle builders, the insurance companies, the authorities and the public.

MITCHELL SPECIALTY CO.
PHILADELPHIA PENNSYLVANIA

DETROIT OFFICE FISHER BLDG.



PERFECT CASTERS
PERFECT STAINLESS STEEL BASE GLIDES
BRAKE GLIDES

PERFECT CASTER MFG CO.
INC.
MANUFACTURERS OF PERFECT FURNITURE CASTERS
STRONG PROOF—QUADRUPLE BALL-BEARING
SWIVEL THE QUICKEST—MOVE THE EASIEST—LAST THE LONGEST
P. O. Box 2005, Station B Factory—3017 East 11th Street
LONG BEACH, CALIFORNIA

Branch Offices
33 N. Clinton Street
Chicago, Ill.
2147 Prospect Avenue
Cleveland, Ohio
342 East 42nd Street
New York City, N. Y.

April 1, 1929

Subject: Kantlink Lock Washers

Gentlemen:

Being a manufacturer of large quantities of casters of which the more popular type require a lock washer in the wheel assembly, the inconvenience and loss of time plus the tedious work of untangling the so called standard lock washer was so apparent that we considered using the Kantlink washers.

Of course, there was the subject of cost involved and we thought perhaps that the additional cost would more than offset this trouble, but after using several hundreds of thousands of Kantlink lock washers and knowing that the additional cost was more than absorbed by the benefits and speed gained, we therefore would not consider going back to the so called standard type of lock washer which in our assembly work was handled more in the shape of clusters than in individual lock washers.

We heartily endorse the Kantlink lock washers and have nothing further to say except that we are entirely satisfied.

Yours for PERFECT satisfaction,
PERFECT CASTER MFG. CO.
Allen B. McGrath
Superintendent

AGMcG:AP

". . . . after using several hundreds of thousands of Kantlink . . . . and knowing that the additional cost was more than absorbed by the benefits and speed gained . . . . we would not consider going back to the so called standard type of lock washer . . . . We heartily endorse the Kantlink lock washers . . . ."

It will pay you to write today for information about Kantlinks to any one of the manufacturers listed below.

"Being a manufacturer of large quantities of casters of which the more popular type require a lock washer in the wheel assembly, the inconvenience and loss of time plus the tedious work of untangling the so called standard lock washer was so apparent that we considered using the Kantlink washers.

"Of course, there was the subject of cost involved and we thought perhaps that the additional cost would more than offset this trouble, but after using several hundreds of thousands of Kantlink lock washers and knowing that the additional cost was more than absorbed by the benefits and speed gained, we therefore would not consider going back to the so called standard type of lock washer which in our assembly work was handled more in the shape of clusters than in individual lock washers.

"We heartily endorse the Kantlink lock washers and have nothing further to say except that we are entirely satisfied."

Made and sold under license by the Kantlink Manufacturers:

The American Nut & Bolt Fastener Co.
Pittsburgh, Pennsylvania

Beall Tool Co.
East Alton, Ill.

The Mansfield Lock Washer Co.
Mansfield, Ohio

The National Lock Washer Co.
Newark, N. J., Milwaukee, Wis.

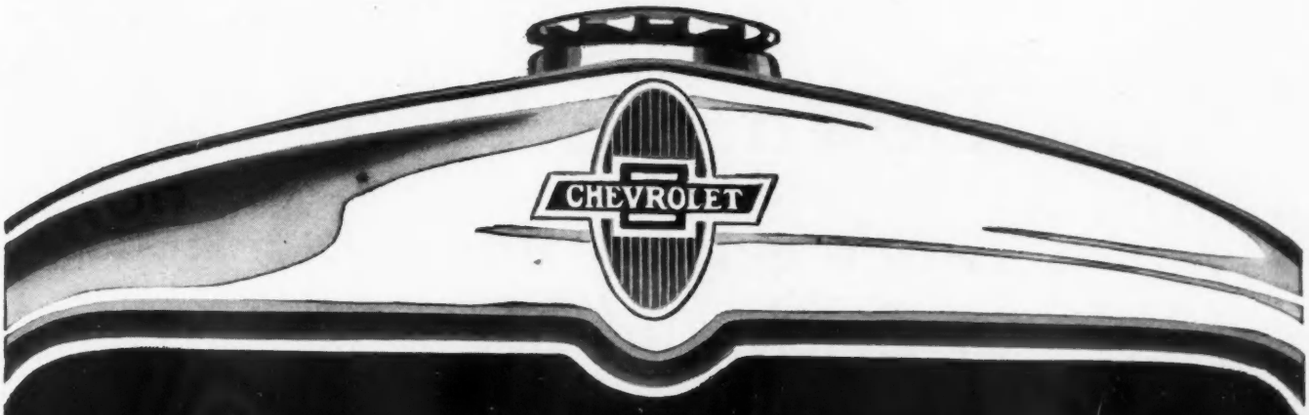
The Positive Lock Washer Co.
Newark, New Jersey

The Reliance Manufacturing Co.
Massillon, Ohio

3083
3091

KANTLINK TRADE MARK SPRING LOCK WASHERS
DO NOT TANGLE DO NOT RUST

THEY PAY THEIR ENTIRE COST IN TIME SAVED - SOMETIMES EVEN MORE



The present Chevrolet Six— like all Chevrolets for 12 years past —is Harrison equipped

HARRISON RADIATORS

Keep Down the Overhead—

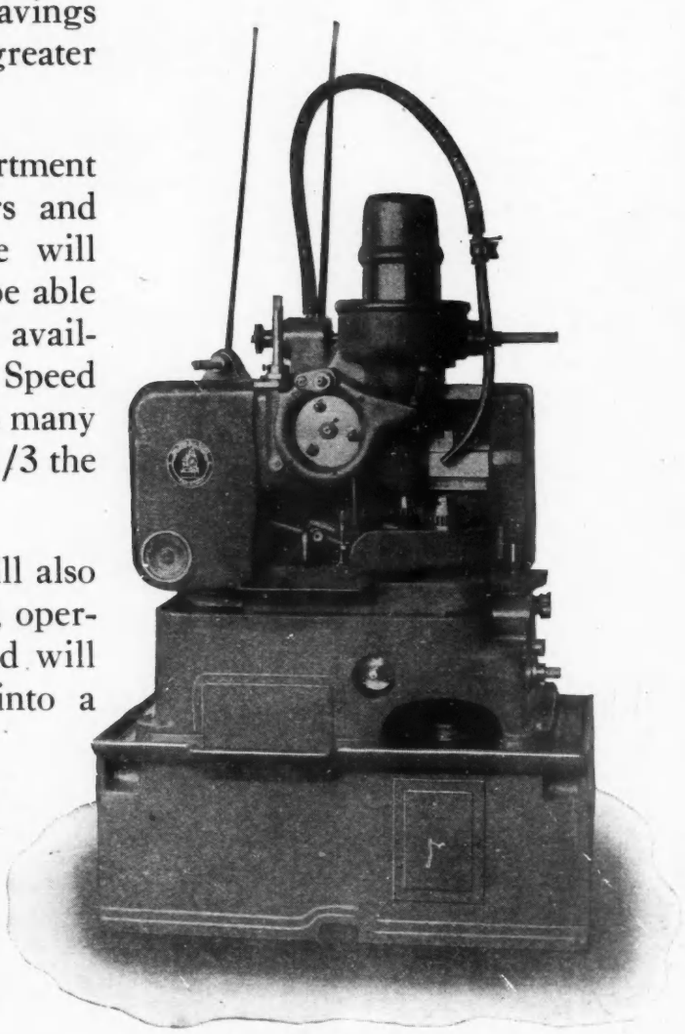
"Don't get too much invested in Brick and Mortar"

Of course every manufacturer wants to make a good profit in 1930. Economy of floor space and its attendant savings will go a long way to help make greater profits.

Equip your gear cutting department with High Speed Gear Shapers and additional manufacturing space will not be necessary—you will also be able to make more profitable use of available space because the High Speed Gear Shaper will produce just as many gears as you are now getting in 1/3 the space.

The High Speed Gear Shaper will also reduce your power consumption, operating and overhead expenses and will convert a manufacturing loss into a profit.

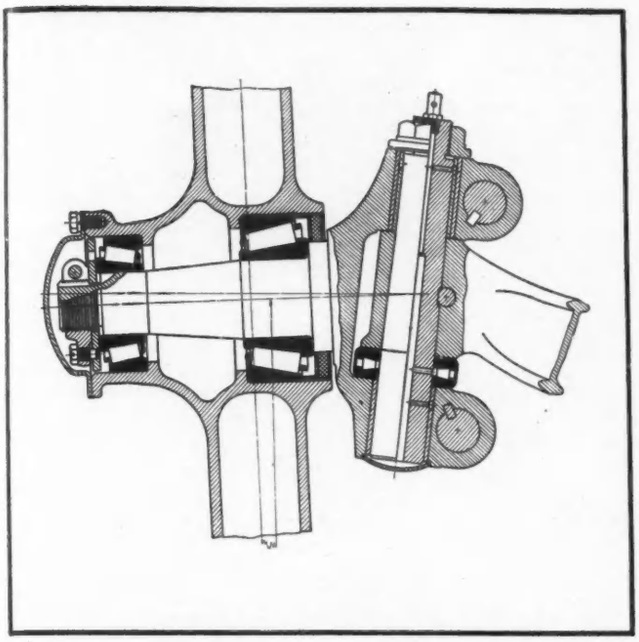
You can operate your gear cutting department at a profit on reduced manufacturing schedules, if it is equipped with High Speed Gear Shapers. Yes! We can and have proved it. We stand ready to help you make a profit in 1930.

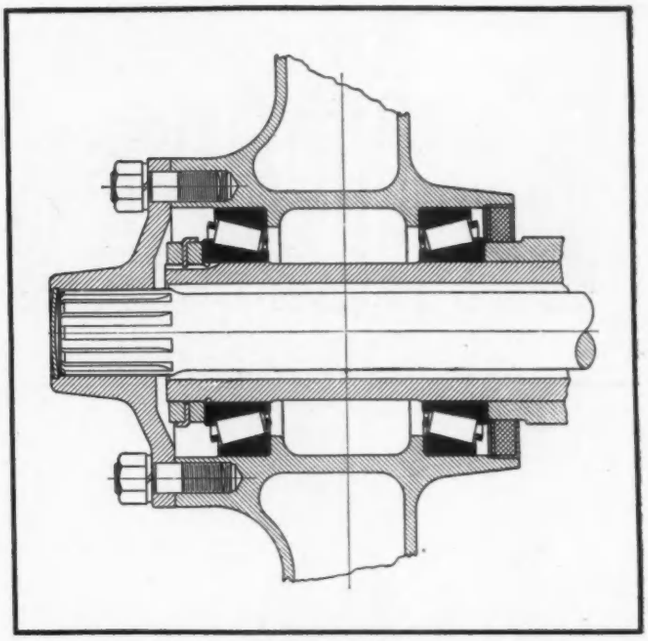


The High Speed Gear Shaper—the ideal machine for either increased or decreased manufacturing schedules.

THE FELLOWS GEAR SHAPER COMPANY

Head Office and Works: 78 River St., Springfield, Vt., U. S. A.
Branch Office: 1149 Book Bldg., Detroit, Mich.





Maximum Wheel Capacity

TIMKEN BEARING EQUIPPED

Elimination of friction constitutes but a part of the function of bearings in automobile wheels.

Of even greater importance is the capacity to carry, safely and surely, the heavy diversified loads which wheels *must* carry.

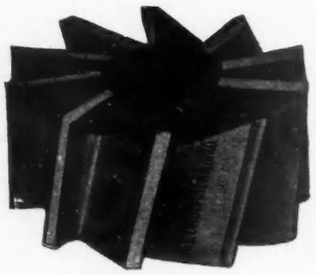
In front and rear wheels alike, it takes the exclusive combination of Timken tapered construction, Timken *POSITIVELY ALIGNED ROLLS* and Timken steel to completely overcome *thrust, radial and combined loads,* shock and torque, and thus insure the factor of safety under every condition of speed and road.

And Timken versatility likewise safeguards *efficiency* —not only in wheels, but in differential, pinion and steering.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN *Tapered Roller* **BEARINGS**

BRUBAKER



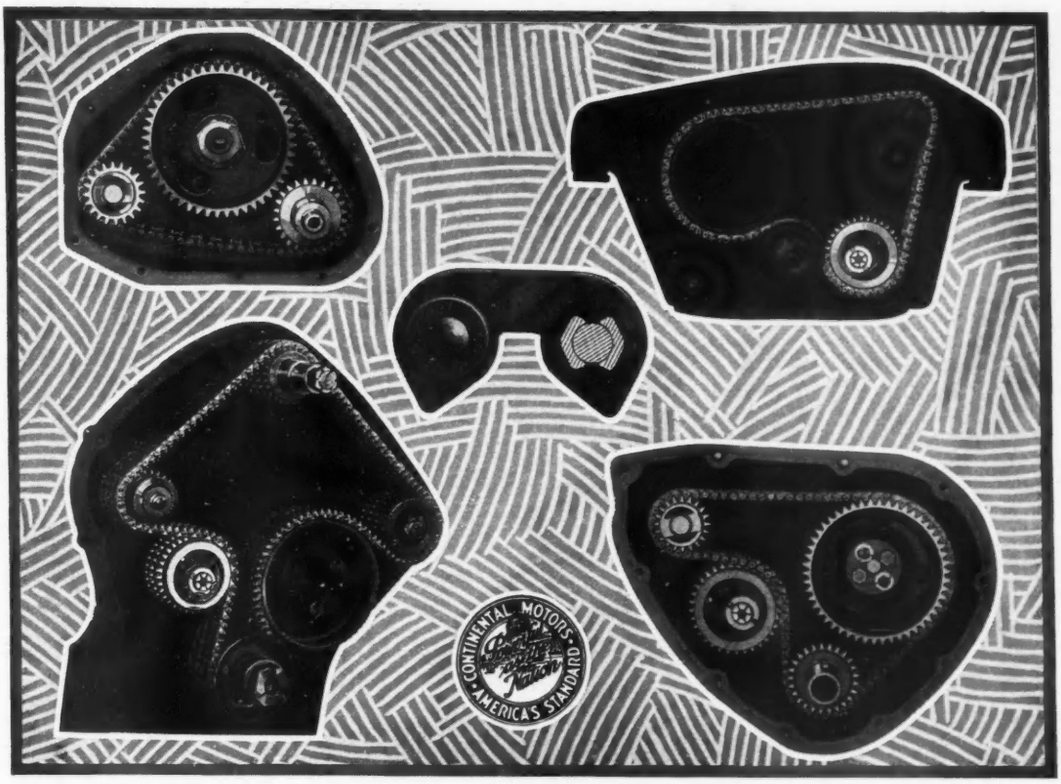
BRUBAKER Taps, Dies, Reamers, Cutters are one of the country's oldest and best known lines of small tools. Specializing for a great many years in railroad tools, we point with pride to the fact that there is scarcely a railroad that does not use our products.

And now in the automotive field, we are duplicating our railroad success.

We are very much interested in designing and developing special tools for special purposes. Send us your inquiries.

W. L. Brubaker & Bros. Company
Millersburg, Pa.

Continental Motors and . . . . . Link-Belt Silent Chain



Continental Motors build many different types of engines, and the above layouts show some of the Link-Belt chain arrangements they have employed. Each was designed to meet a specific condition.

Whether the most convenient and efficient layout calls for 2, 3 or more wheels, or for manual or automatic adjustment of chain tension, Link-Belt can furnish the type that suits the requirements best.

LINK-BELT COMPANY - INDIANAPOLIS - DETROIT

LINK-BELT

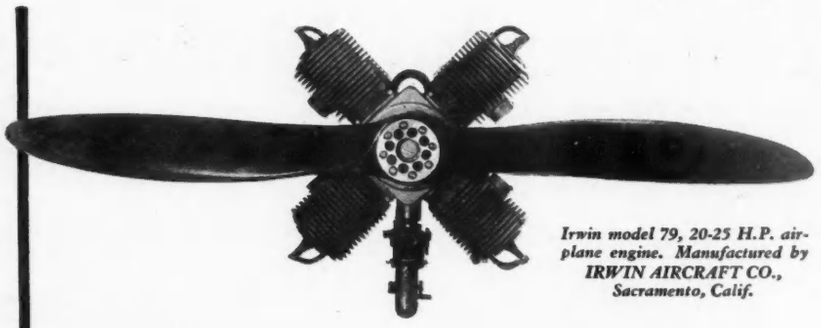
AUTOMOTIVE SILENT CHAIN

3835

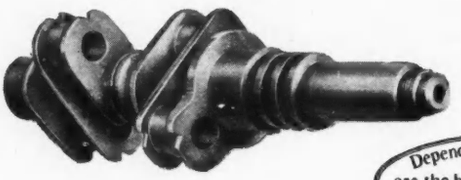
MANUAL ADJUSTMENT SILENT AUTOMATIC ADJUSTMENT

Nickel Alloy Steel Parts
used in Irwin engine:

CRANKSHAFT
WRIST PINS
MAGNETO DRIVE
TACHOMETER DRIVE
VALVE GUIDES
ALL STUDS
CAP SCREWS
NUTS

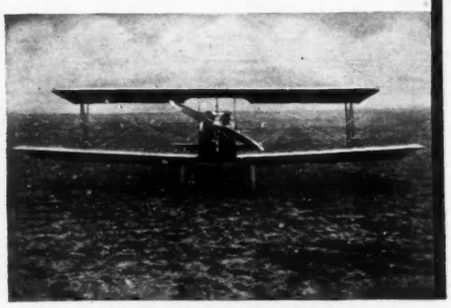


Irwin model 79, 20-25 H.P. airplane engine. Manufactured by IRWIN AIRCRAFT CO., Sacramento, Calif.



Dependable materials are the best assurance of dependable performance

Crankshaft of Irwin model 79 airplane engine. Altho this crankshaft carries four throws, the entire length is only 11 inches and it weighs, finished, but 6¼ lbs. It is machined from a solid forging weighing approximately 85 lbs.



Irwin Meteorplane equipped with Irwin engine weighing only 60 lbs.

Irwin

the 60-lb. airplane engine

uses *Nickel Alloy Steel* parts

THE Irwin airplane engine, used as standard equipment in the Meteorplane, is one of the lightest weight aircraft engines now being produced in this country. It develops 20 H.P. at 1730 R.P.M. and 25 H.P. at 2200 R.P.M. and weighs complete only 60 lbs.

Nickel Alloy Steel was selected for all parts of the Irwin engine which require high strength or maximum resistance to wear. Years of industrial experience and exhaustive laboratory tests have demonstrated that the mechanical properties of Nickel Steels produced from different heats vary less than those of any other commercial steels.

In designing aeroplane engines the minimum values of the various structural materials used must be definitely known since, to save weight, section size must be pared to a minimum consistent with safety. As the mechanical properties of Nickel Steels are definitely established and are dependably uniform, their use makes possible light weight dependable design.

The widespread use of Nickel Alloy Steel parts by practically all manufacturers of airplane engines is conclusive proof of the dependability of these alloys. The experience of typical users has contributed to an extensive fund of valuable technical data. You are invited to consult our engineers and to draw upon this helpful information.

Nickel
FOR ALLOY STEEL

SEND FOR "BUYERS' GUIDE TO NICKEL ALLOY STEEL PRODUCTS"

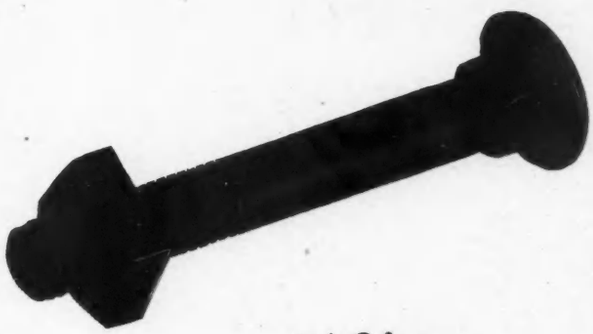
THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y.

EMPIRE BOLTS · NUTS · RIVETS

PROMISES! Faith in their performance is the background of all business! The foundation of credit! The builder of reputations!

• • • •

In the great bolt and nut plants of Russell, Burdsall and Ward, the promise is regarded as a solemn obligation. It is kept as inviolate today as it was in 1845 and the years of growth that followed.

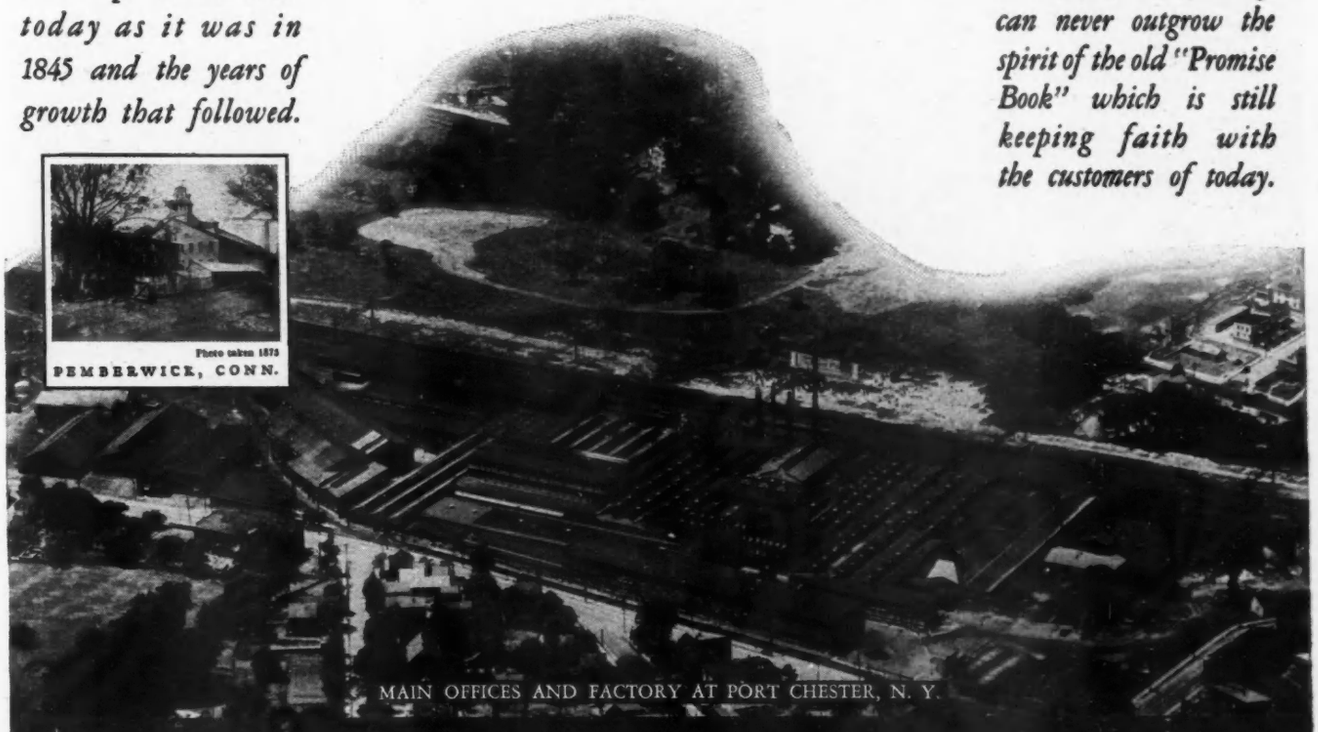


84 Years of Keeping Faith

In the old "Bolt Works" at Pemberwick, Connecticut, promises made to customers were written down in the "Promise Book," a book whose obligations were religiously adhered to.

Today, the three great modern factories at Port Chester, N. Y., Rock Falls, Ill. and Coraopolis, Pa. have far outgrown the little old plant at Pemberwick, but they can never outgrow the spirit of the old "Promise Book" which is still keeping faith with the customers of today.

Photo taken 1875
PEMBERWICK, CONN.



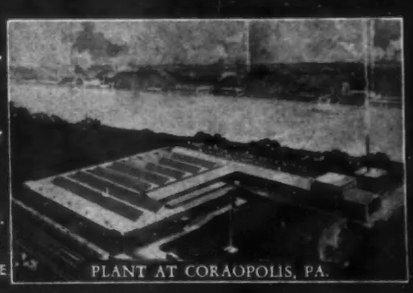
MAIN OFFICES AND FACTORY AT PORT CHESTER, N. Y.

PLANT AT ROCK FALLS, ILL.

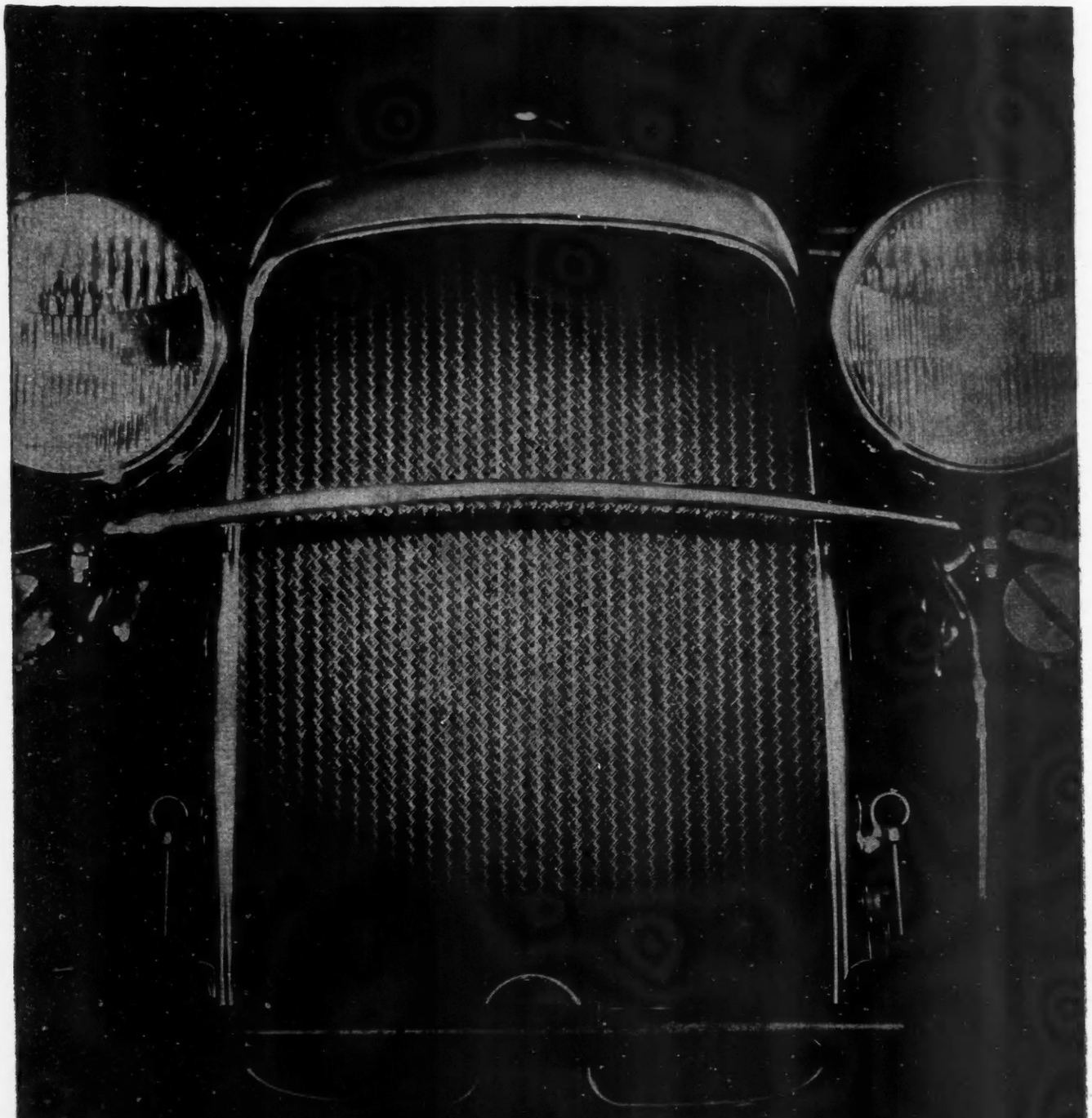
RUSSELL, BURDSALL & WARD
BOLT AND NUT COMPANY
PORT CHESTER, N. Y.

ROCK FALLS, ILL. CORAOPOLIS, PA.

CHICAGO · DETROIT · PHILADELPHIA
SAN FRANCISCO · LOS ANGELES · PORTLAND · SEATTLE



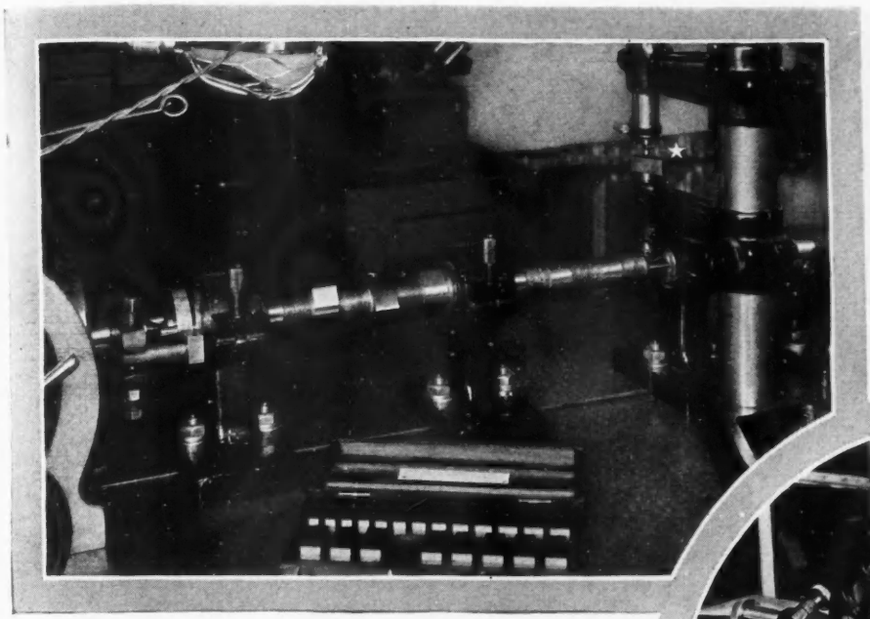
PLANT AT CORAOPOLIS, PA.



Mass motor car production depends on the unfailing reliability of the manufacturers' purveyors. McCord production is keyed to deliver radiators and gaskets on time—all the time.

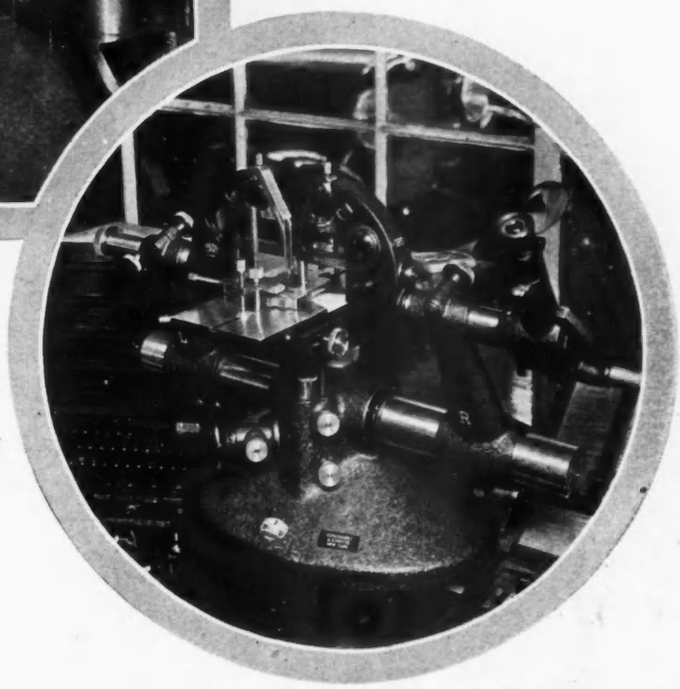
McCORD

RADIATOR & MFG. CO. . . . DETROIT. MICH.



LEFT: *Setting master gage for checking cam shaft with Johansson Gage Blocks*

BELOW: *Setting inside optometer with Johansson Gage Blocks and Accessories*



Precision

that knows no parallel is yours with Johansson Gages!

MACHINE shop methods today demand a degree of accuracy considered impossible a few years ago. Highly specialized operators have replaced the "all-round" machinist. High-speed, quantity production has superseded the "cut-and-try system" that once prevailed. Specifications run to a few ten-thousandths of an inch, so that finished parts, machined in different departments, will fit in assembly. You can assure this accuracy in your products with a set of Johansson Gage Blocks.

These gage blocks of hardened and stabilized steel are "the world's standard of measurement"—used in the factories and government laboratories of every nation. By special processes, they are finished to accuracies of eight, four or two-millionths of an inch! This precision makes it possible to hold your gages and tools within their specified limits, eliminating the chance of costly errors in measurement.

When Johansson Gage Blocks are cleaned and slid together with a slight inward pressure, they take hold as though magnetized and handle like a solid block. A complete set of 81 gage blocks will build more than 120,000 different size gage block combinations in steps of one ten-thousandth of an inch. They are the most flexible, as well as the most accurate measuring tools ever devised. They may be applied direct—are virtually "fool-proof"—give the same results any number of times with different mechanics.

Checking a ring gage with Johansson Gage Blocks and Accessories

Johansson Gage Blocks are now available in commercial quantities at commercial prices because of the association of Mr. Johansson with the Ford Motor Company. There is a set designed to answer your own precision problems. List maximum and minimum dimensions of your product, together with your closest working limits.

C. E. JOHANSSON, *Inc.*

Division of **FORD MOTOR COMPANY**

Detroit, Michigan

Write direct, or to your Mill Supply Dealer

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Full Finished Sheets

New York
1572 Woolworth Bldg.

Detroit
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Cleveland
728 Union Trust Bldg.

Indianapolis
908 Merchants' Bank Bldg.

A mill of 12,000 tons capacity monthly.

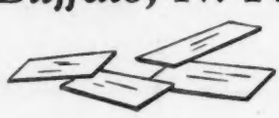
Unusual shipping facilities from Buffalo—railroad center.

Seneca Full Finished Sheets are of uniform finish and unexcelled drawing quality.

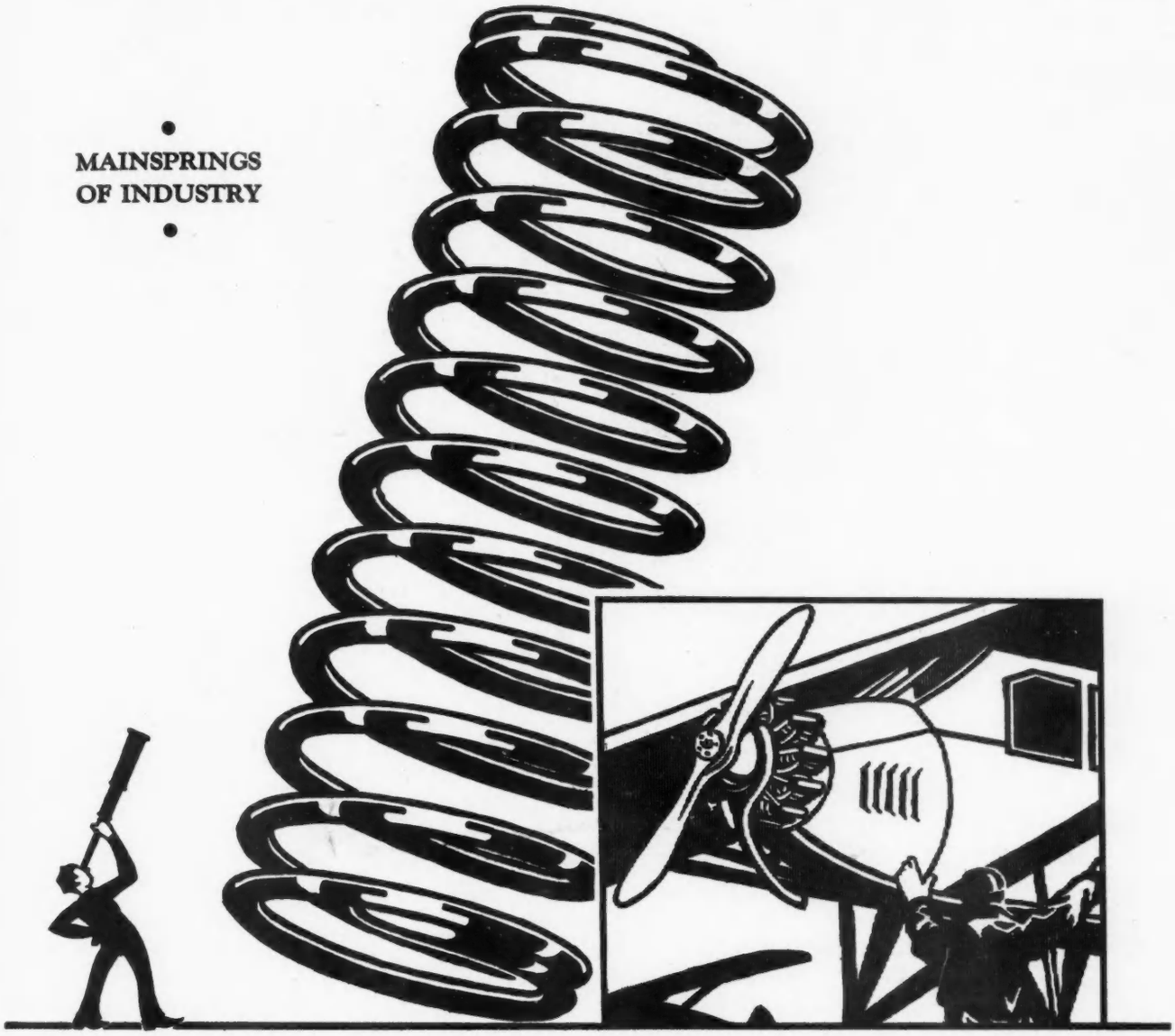
Your inquiries are solicited.

Seneca Iron & Steel Co.

Buffalo, N. Y.



MAINSPRINGS
OF INDUSTRY



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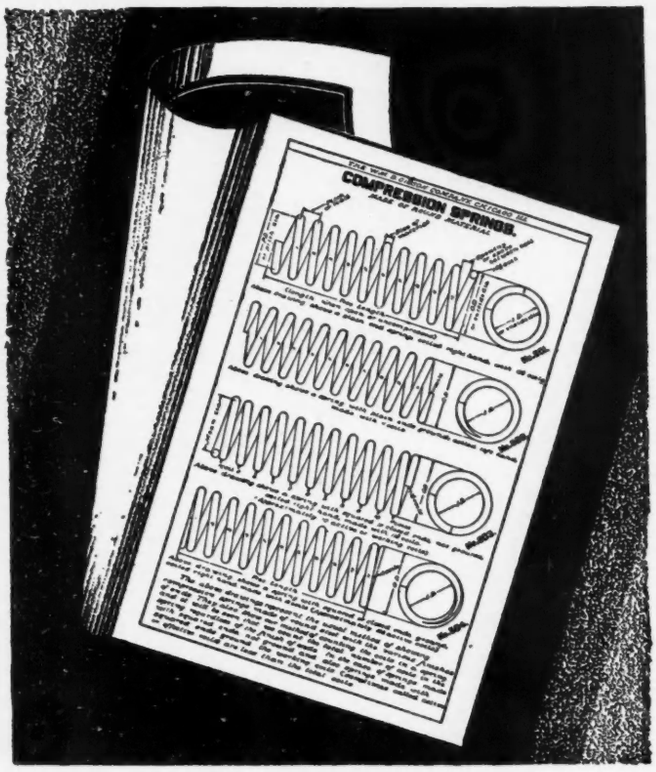
to keep your ***Production Lines*** on the move, Barnes-made springs have been building a reputation for dependable service for years. Won't you tell us your spring requirements —one or a million?

THE WALLACE BARNES CO., BRISTOL, CONN., U. S. A.

Barnes **made**

COLD ROLLED SPRING STEEL
SPRING WASHERS ASSEMBLIES
SCREW MACHINE PARTS
SMALL STAMPINGS

SPRINGS



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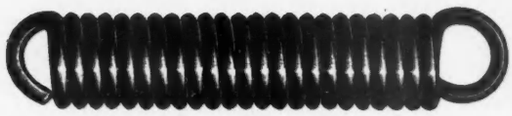

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efficiently in many leading
Products of Industry,
maintaining
the Prestige of that Product
and creating
a Satisfied Customer.

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The convenient and prompt source of supply for any spring needed by the Automotive Industry.

Leaf and Cushion Springs excepted.

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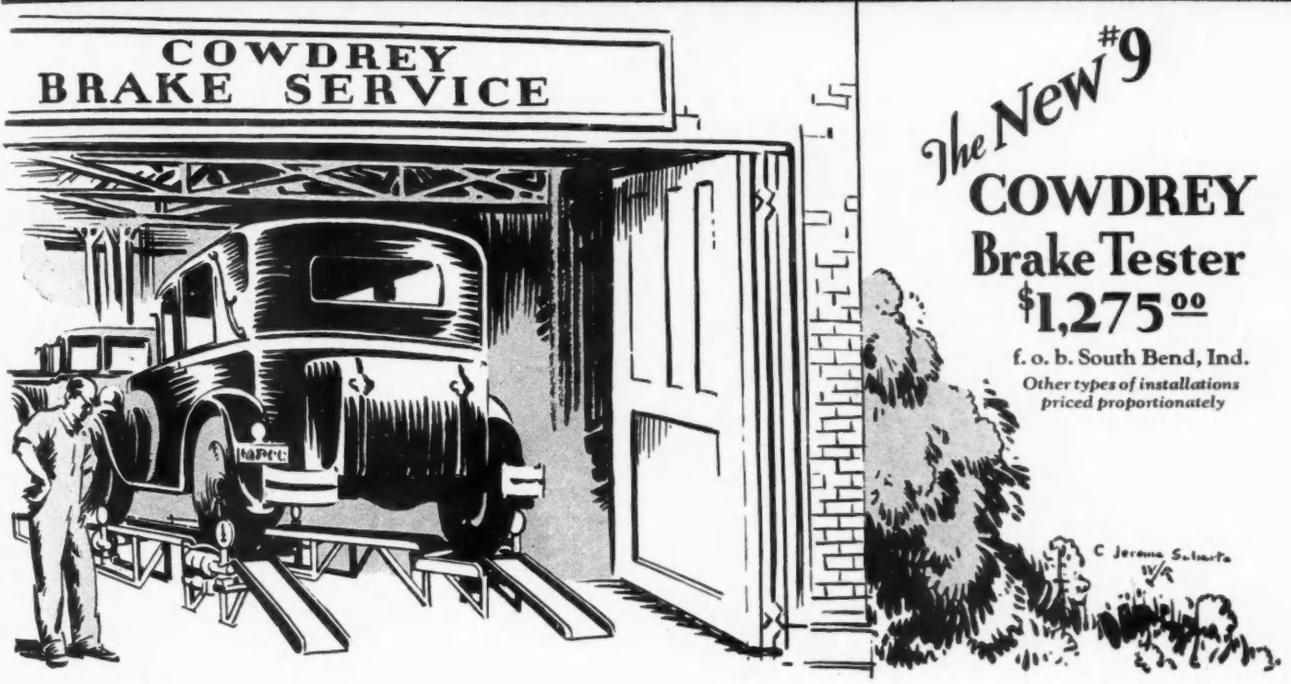


The New #9

COWDREY
Brake Tester
$1,275.00

f. o. b. South Bend, Ind.

Other types of installations priced proportionately

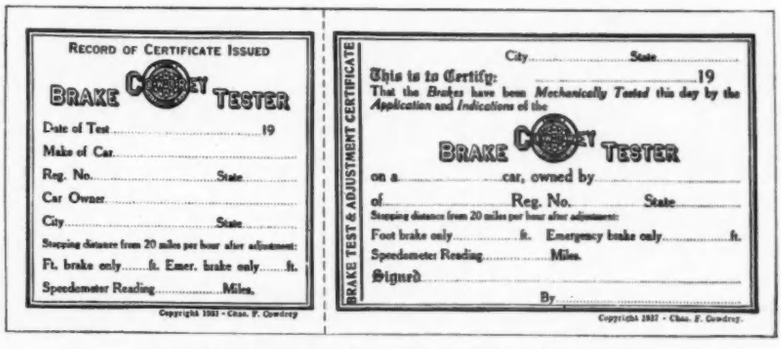
A CAR without 4 wheel brakes couldn't compete in sales today. Yet many cars on the road have 4 wheel brakes in name only.

Car dealers who use the Cowdrey tester assure their customers of the same brake efficiency as when their cars were new . . . and such performance sells more cars.

The Cowdrey brake tester spots brake faults instantly—indicates stopping distance—overcomes need of road testing.

Brake performance is recorded on the exclusive Cowdrey Certificate.

Furthermore—the NEW Cowdrey at $1275 is a profit maker for the shop.



RECORD OF CERTIFICATE ISSUED

BRAKE COWDREY TESTER

Date of Test 19
Make of Car .....
Reg. No. ..... State .....
Car Owner .....
City ..... State .....
Stopping distance from 20 miles per hour after adjustment:
Ft. brake only ..... ft. Emer. brake only ..... ft.
Speedometer Reading ..... Miles.

Copyright 1927 - Chas. F. Cowdrey

BRAKE TEST & ADJUSTMENT CERTIFICATE

City ..... State .....

This is to Certify: 19
That the *Brakes* have been *Mechanically Tested* this day by the *Application* and *Indications* of the

BRAKE COWDREY TESTER

on a ..... car, owned by .....
of ..... Reg. No. ..... State .....
Stopping distance from 20 miles per hour after adjustment:
Foot brake only ..... ft. Emergency brake only ..... ft.
Speedometer Reading ..... Miles.
Signed .....
By .....

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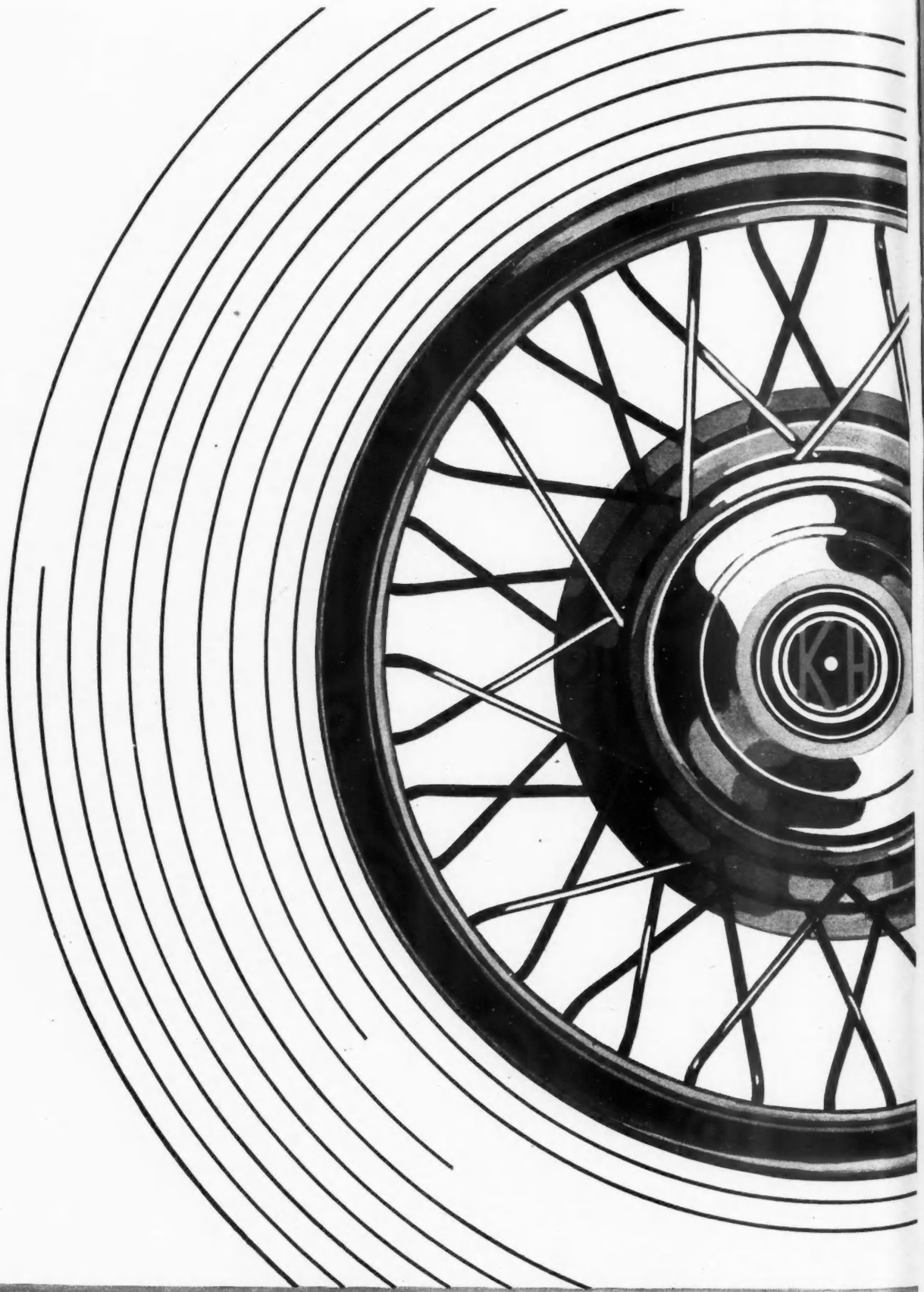
The Cowdrey Certificate of Brake Performance

BENDIX-COWDREY BRAKE TESTER, Inc.

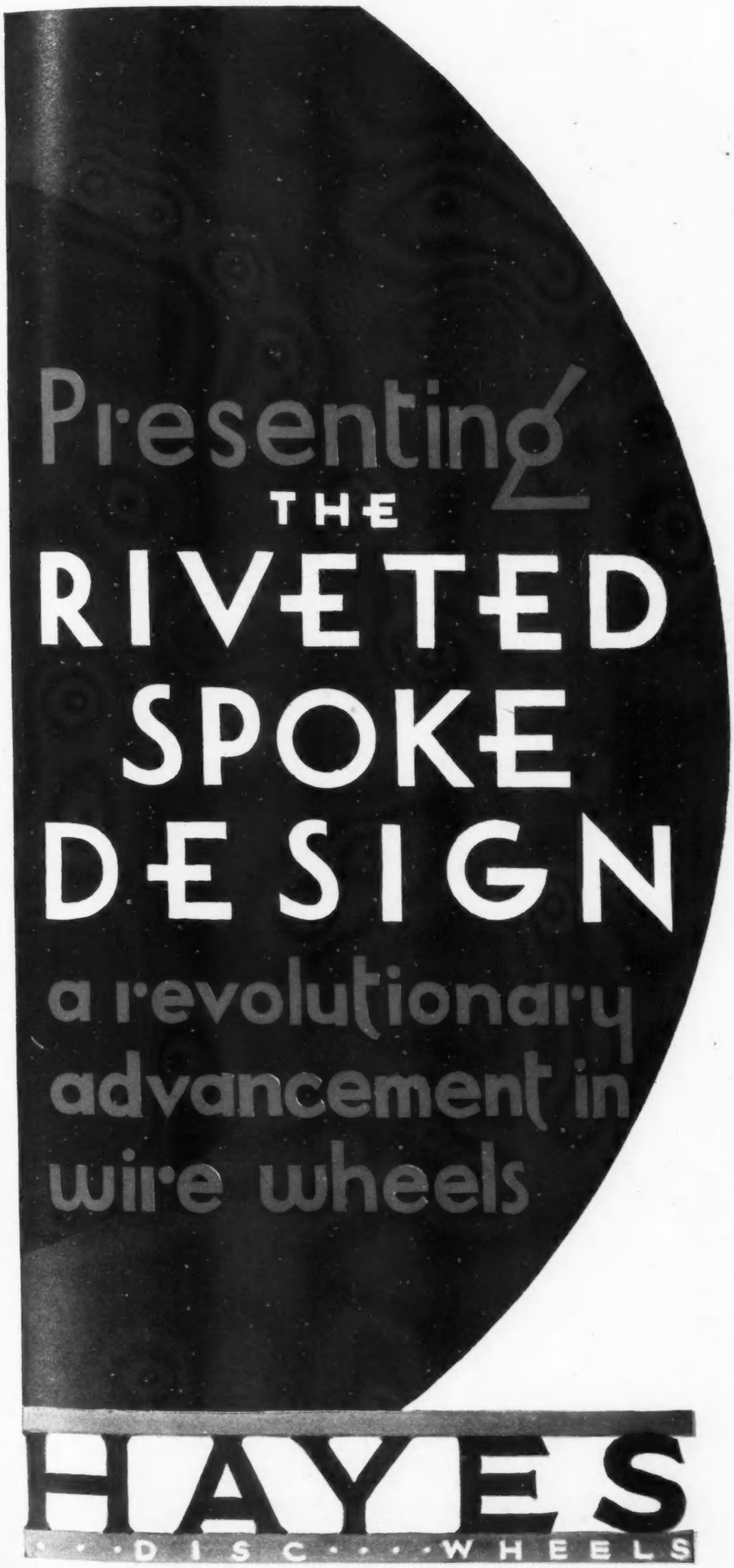
(*Operated by Bendix Aviation Corporation*)

FITCHBURG, MASSACHUSETTS, U. S. A.



KELSEY-

WOOD · · · · WIRE · · ·



THE KELSEY-HAYES Riveted Spoke wire wheel is a new principle in wheel construction which represents a forward step of vital importance to the automobile industry.

Nor is this riveted spoke new in the sense that it is untried. This wheel was put on the market over three years ago. Leading motor car makers in all price classifications are adopting this Kelsey-Hayes product as standard equipment. Over 1,000,000 are in use today.

Briefly, the most important feature of the Kelsey-Hayes Riveted Spoke wire wheel is the permanently equal tension in all spokes obtained by mechanical assembly under compression which means invariable tightness and trueness for the life of the car.

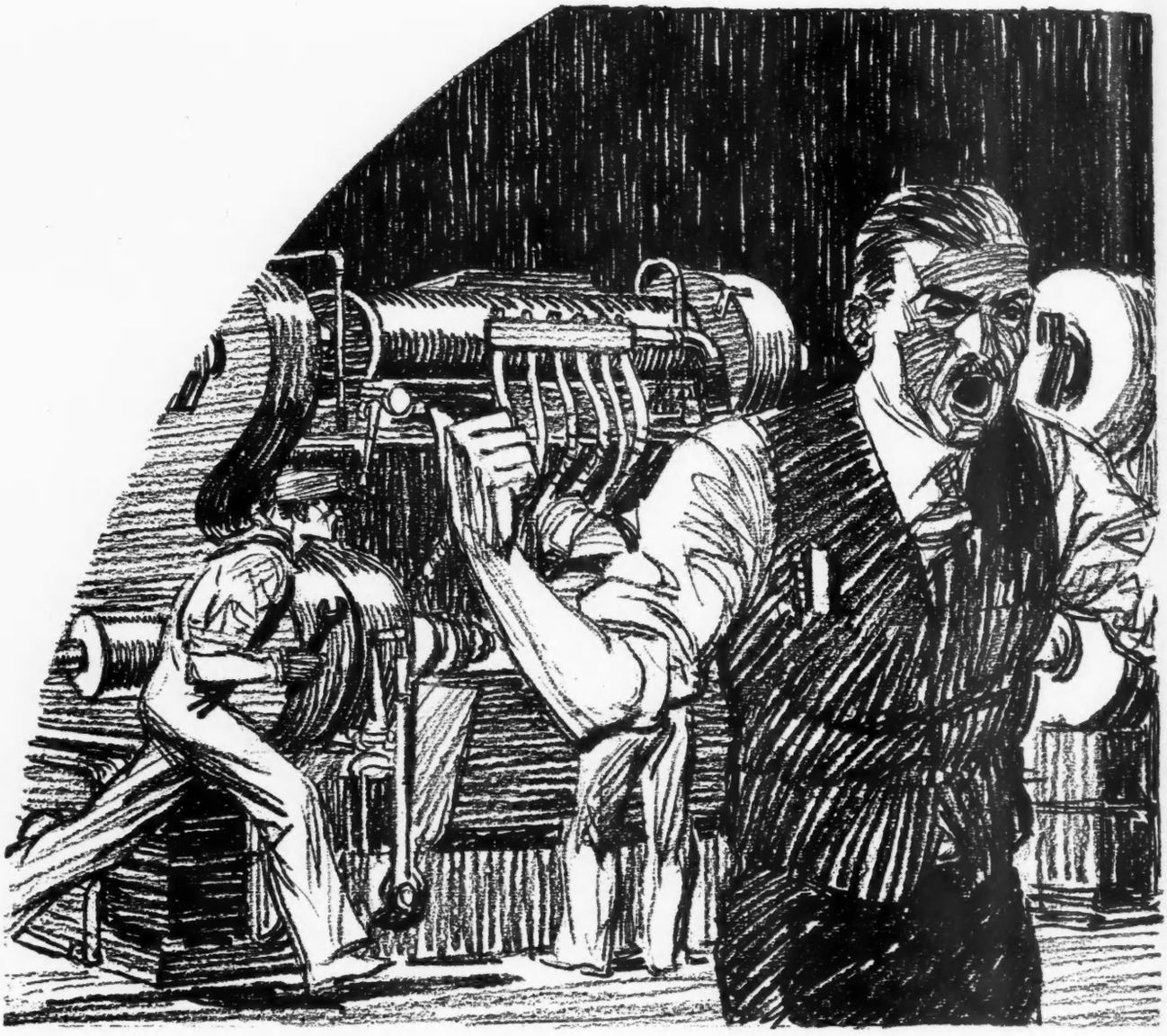
Each spoke is riveted at the rim.

Kelsey-Hayes wheels are perfectly balanced designs of unusual beauty. Their individuality adds a touch of decided smartness to any automobile.

If the car you represent comes with Kelsey-Hayes wheels you can utilize this fact as a selling feature. The beauty your prospects can see. Tell them about the scientific superiority of this modern product.

The automobile industry looks to Kelsey-Hayes as the authoritative source for the latest developments in complete wire, wood and steel wheels.

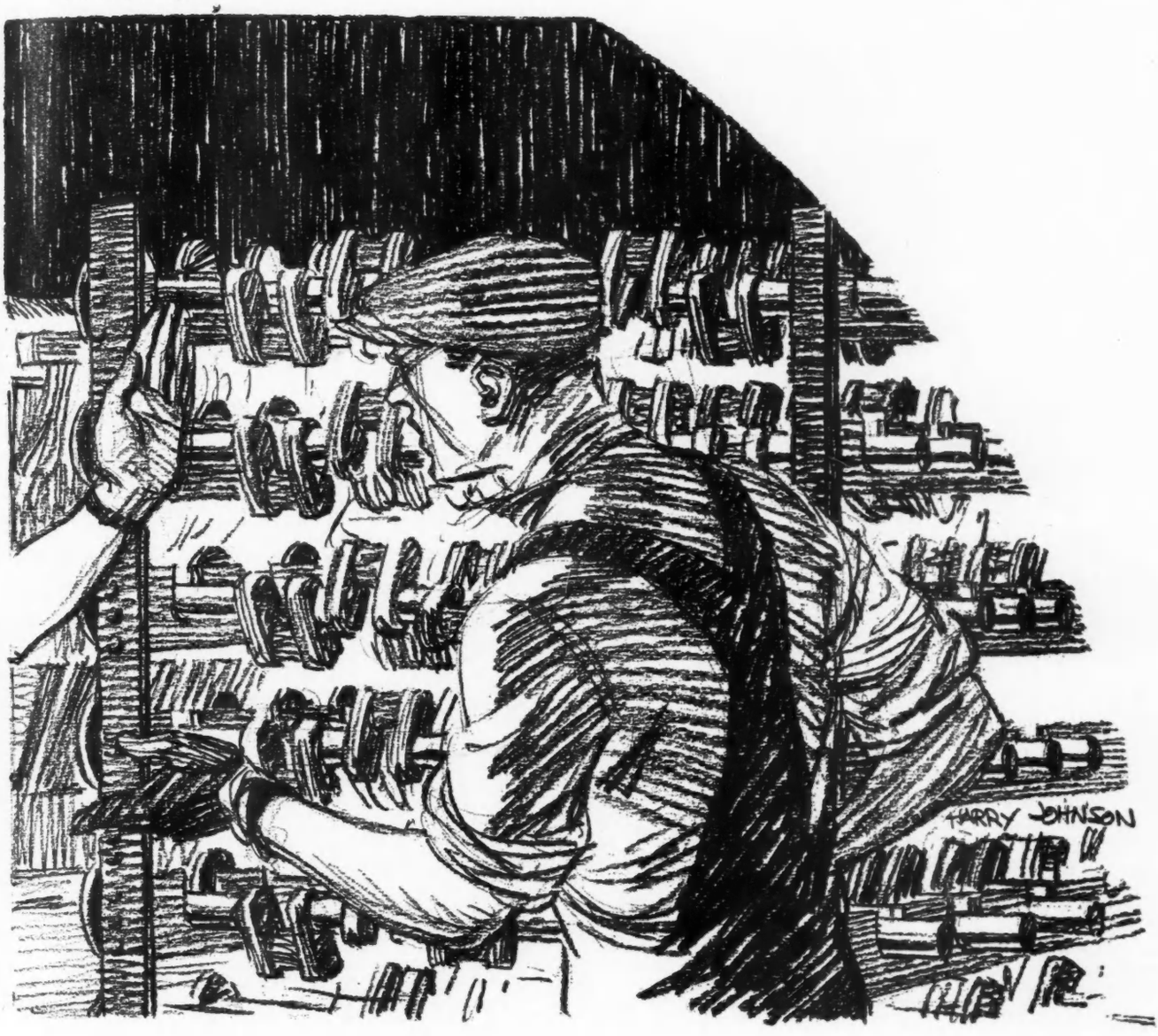
KELSEY-HAYES WHEEL CORP.
DETROIT, MICH.
Affiliated Divisions
Wire Wheel Corp. of America, Buffalo, N. Y.
Kelsey Wheel Company, Memphis, Tenn.
Kelsey Wheel Company, Ltd., Windsor, Ont.



Expensive Economy--

HOLCROFT

Leaders in Building and Designing Electric and Combustion Furnaces, Kilns and Ovens



What does it profit a man to invest from twenty to thirty thousand dollars in a single machine such as an automatic crankshaft lathe, and then have this expensive piece of equipment stand idle hour after hour due to broken or prematurely dulled cutters for which "spotty" or improperly heat treated forgings are directly responsible?

Such expensive machines, to be the exceptionally low cost producers that they inherently are, MUST be backed by heat treating equipment of the same high-production, high-quality calibre. Holcroft Furnaces are just such equipment.

To ascertain, unbiasedly, and without a trace of doubt, whether your furnaces are equal to the task imposed upon them is a Holcroft Engineer's job. A consultation with him won't obligate you in any way—yet it may be the key to uninterrupted production in your shop. It's worth trying, isn't it?

& COMPANY

Home Office: Detroit—Branches: Chicago, Philadelphia; Canada: Hiram Walker & Son, Metal Products, Ltd., Walkerville, Ont.

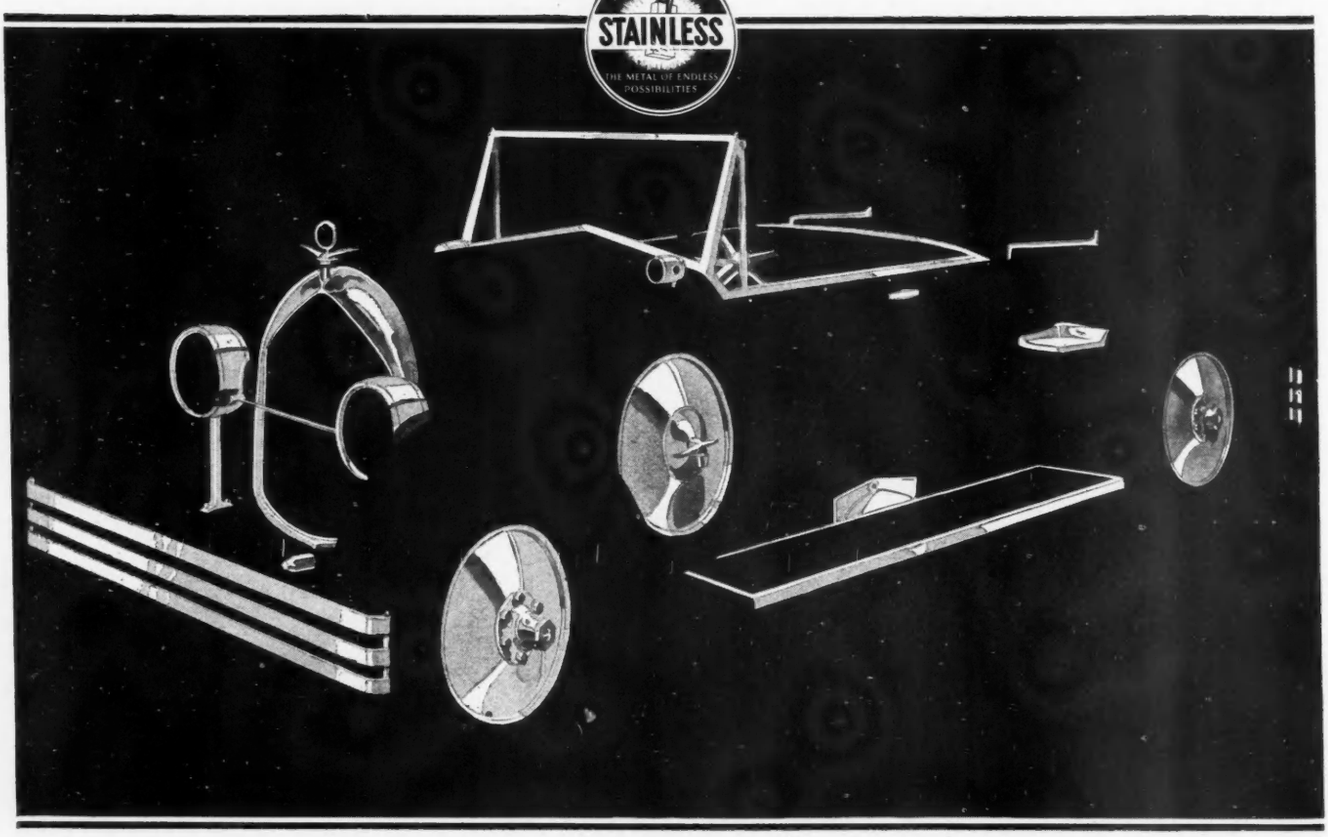
If these parts were STAINLESS STEEL

What a sales weapon for your dealers . . . Handsome "Stainless" metal trim . . . A direct appeal to a motorist's desire for equipment that always looks new . . The permanent lustre of Stainless Steel rivals that of newly polished silver. It never needs polishing, never becomes "brassy" and there is no plating to peel off . . Stainless Steel offers you new opportunities for product improvement . . . added quality, greater efficiency and increased sales appeal . . Stainless Steel can be furnished in 150 to 600 *Brinell* and 60,000 to 250,000 pounds per square inch *tensile strength.* There is a type for every need . . The use of Stainless Steel has a strong sales advantage in Lamps Radiator Shells . . . Bumpers . . . Hood and Door Hinges . . . Cowl Moulding . . . Mud Guards . . . Handles . . . Disk and Wire Wheels . . . Tire Rims . . . Windshield Brackets and Wipers . . . Side Aprons . . . Nuts, Bolts and Screws . . . Instrument and Running Board Trim . . . Water Pump Shafts . .

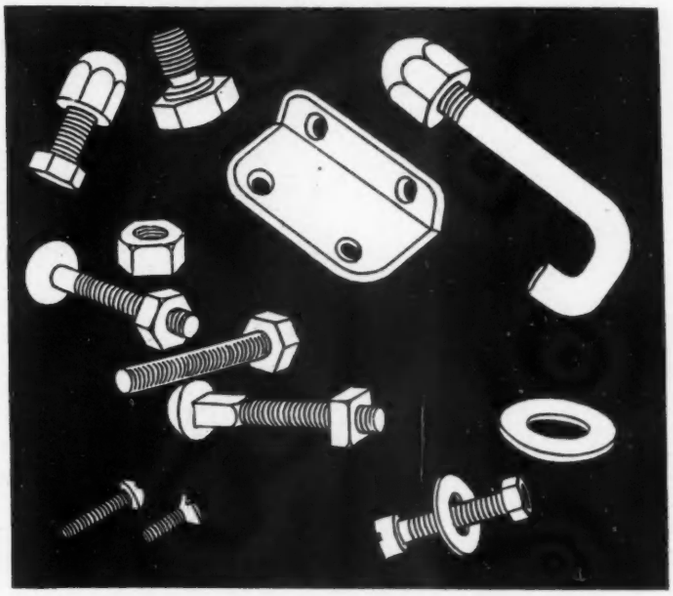
Genuine Stainless Steel is manufactured only under the *Patents* of

AMERICAN STAINLESS STEEL COMPANY

Commonwealth Building Pittsburgh, Penna.



Carpenter
STAINLESS
STEEL NO.



begging

TO BE MADE OF STAINLESS

IN the motor car of today are literally hundreds of steel parts which if made from Stainless would be immeasurably more efficient and would add envied selling points. These parts have been patiently waiting for just such a steel as Carpenter No. 5. And doubtless their makers would long before this have been using Stainless—had it ever before possessed the *workability* of this new Carpenter No. 5.

Think—here's a Stainless that is stainless to the core, and requires no special treatment to *keep* it stainless—yet can be handled as easily as most ordinary steels. You *set up as for ordinary screw stock*—do not change cutting angles, slow down speed or do any special adjusting. And this new Stainless will go through without a hitch, without a murmur.

It does not pile up on your tools. It does not delay production. It machines—grinds—polishes readily, easily.

And you can *prove* it—we want you to. Write for samples of Carpenter No. 5 and test them on your own machines. We'll send them gladly, together with some specific data about this history-making Stainless that you'll find very interesting.

THE CARPENTER STEEL CO.
READING, PA.

Licencee under the patents of the American Stainless Steel Co.

Carpenter
STAINLESS STEEL

NO. 5
Easy to machine
Easy to grind
Easy to polish

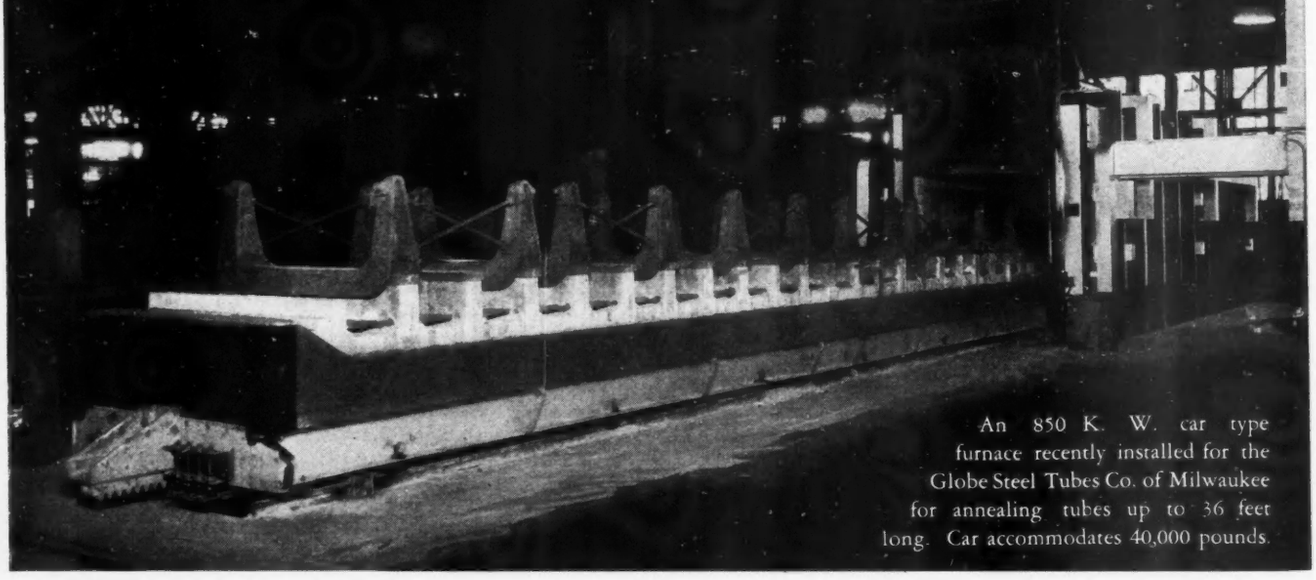
PATENT APPLIED FOR

Globe Steel Tubes Co.

Investigated Electric Heat

—and as a result these progressive producers of flawless, seamless tubular products, have raised their already high standard, and are insuring more uniform quality and dependable accuracy by heat treating their products to scientific exactness in electric furnaces designed and built by—

The Electric Furnace Co.
Salem, Ohio



An 850 K. W. car type furnace recently installed for the Globe Steel Tubes Co. of Milwaukee for annealing tubes up to 36 feet long. Car accommodates 40,000 pounds.

Full coverage type American Brake-bloks installed on a Hydraulic Brake.

Better.. Braking

DEMANDS UNIFORM DECELERATION

AFTER a proper co-efficient of friction for a brake has been determined upon, a change in that co-efficient of friction prevents uniform deceleration. Such changes are brought about by a deterioration of the lining because of frictional heat and an impairment of its frictional quality because of wear, water, oil, gasoline, grease, and road dirt.

Because of the formula by which Brake-bloks are made, this new braking material escapes from the damaging effects of those factors which have heretofore always meant trouble for the braking engineer.

Whether used on external or internal brakes; whether equipped with manual or power leverage; whether installed on motorcycles, passenger cars, trucks or buses—a better braking surface should have the following characteristics:

The Ten Commandments of the Braking Engineer

1. Proper co-efficient of friction through entire life.
2. Uniform deceleration.
3. 100% recovery from effect of oil and water.
4. Non-compressible under braking pressures.
5. Non-abrasive, to avoid drum scoring.
6. Will not vibrate (a dampener for squealing).
7. Long life (will not burn, glaze, soften or wedge).
8. Heat-resisting (will neither soften or swell).
9. Efficient on either steel or cast iron drums.
10. Uniformity of product.

Engineers and designers are invited to send for our booklet "Braking Facts." Strictly technical but extremely interesting.

AMERICAN BRAKE MATERIALS CORPORATION
Industrial and Automotive Division American Brake Shoe & Foundry Company
4660 Merritt Avenue Detroit, Michigan, U. S. A.
Sales Offices: Chicago . . . New York . . . San Francisco

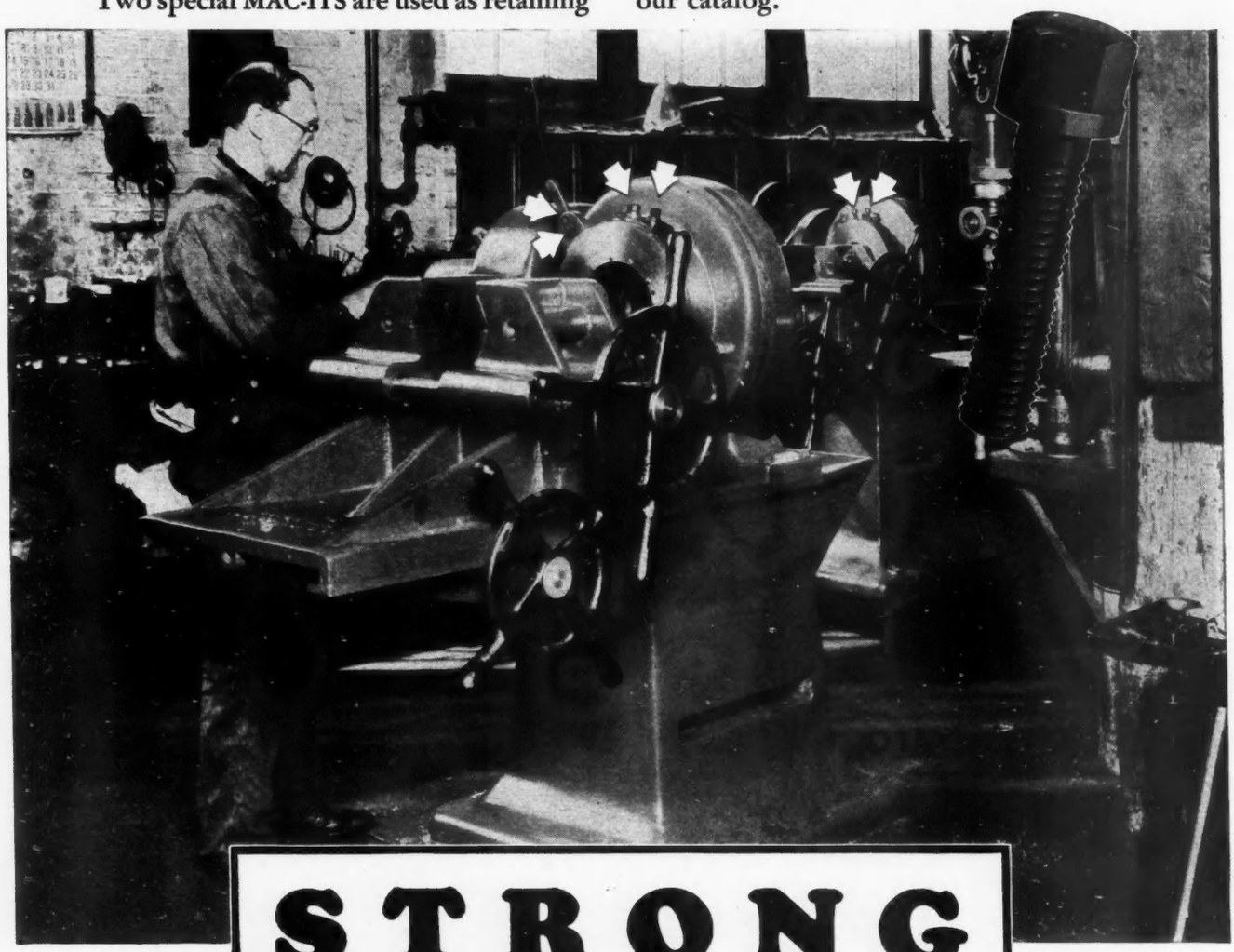
American

BRAKE BLOKS

Oster uses special *Mac-its*

AT five vital points of stress in the die heads of Oster pipe threading and cutting-off machines, MAC-IT Set Screws are standard. In this powerful motor-driven machine having a capacity up to 6-inch pipe, The Oster Manufacturing Company's reputation for building portable heavy duty equipment to precision standards is well protected.

Two special MAC-ITS are used as retaining screws for locking the setting plate adjustable dies at required diameter. The spring screw, and the retaining and fulcrum screws in the setting lever are all special MAC-ITS. Oster machine users can depend on it that these five MAC-ITS will not break, mushroom at the point, or become distorted with long use. MAC-ITS for most purposes can be shipped out of stock, and are shown in our catalog.



STRONG CARLISLE & HAMMOND

Mac-it Cap Screws are made in Socket, Fillister, Button, Flat, Round, Hexagon and SAE Hexagon Head in a full list of sizes. Price List and samples on request.

Mac-it Set Screws are made in Hollow, Square-Head, Tool Post, Mining Machine, Railroad Eccentric and Slotted Headless types in a full list of sizes. Ask for Catalog.

1392 WEST THIRD STREET, CLEVELAND, OHIO

PERFECT CIRCLE

Achievement

Achievement Number Three

Shape

PERFECT CIRCLE discovered long ago that the fact that a piston ring shut out light in a solid round gauge did not indicate correct shape—for it took no account of the different pressures the ring might exert against various points on the gauge. Casting aside old ideas, PERFECT CIRCLE undertook to develop a new shape, so perfect in its contours and wall pressure that it would contact the cylinder wall at all points on its periphery, even at excessively high speeds. And PERFECT CIRCLE succeeded. As a result, PERFECT CIRCLE rings control "blow-by" and oil consumption in such a manner that the makers of fine cars definitely prefer them as original equipment.

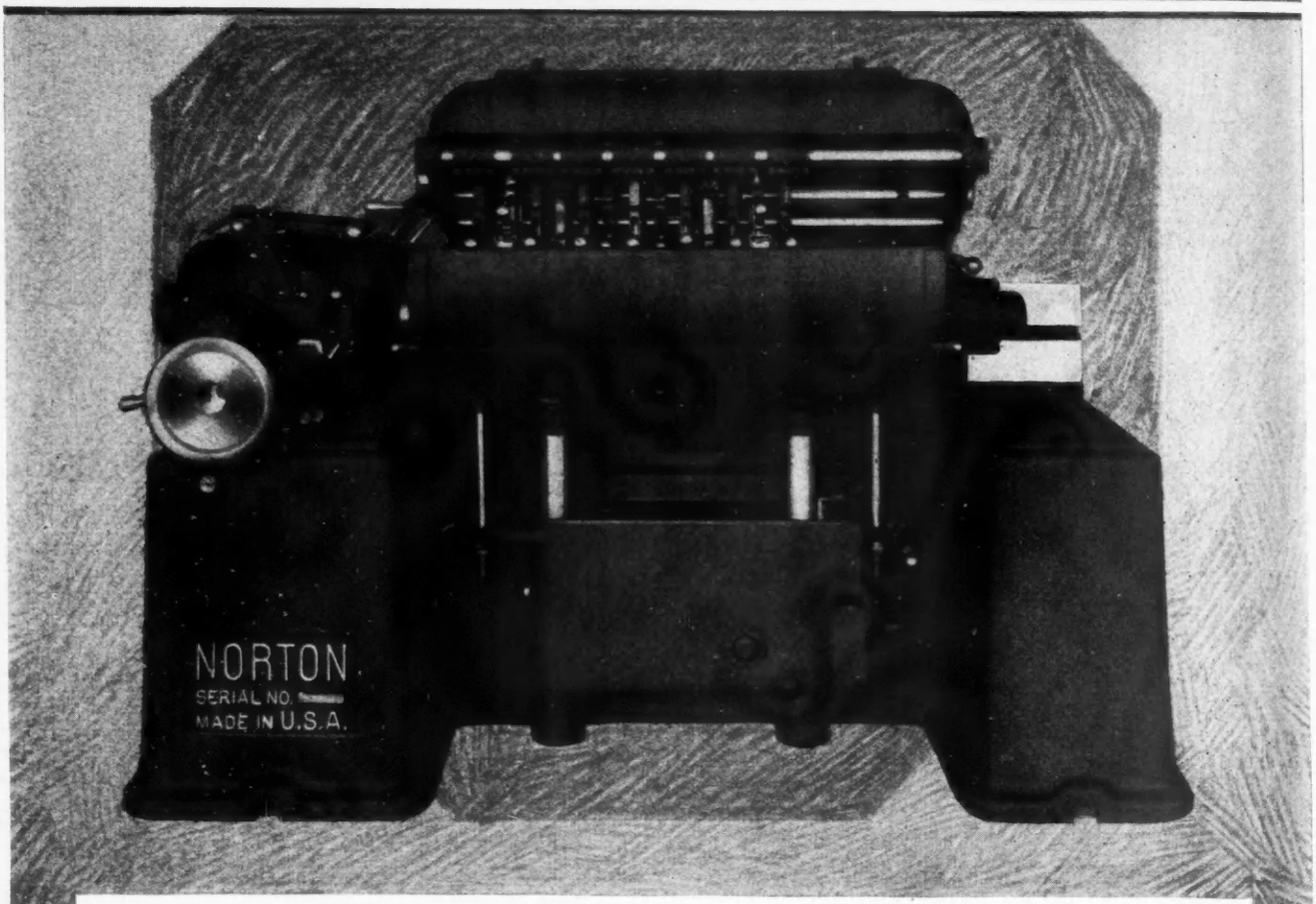
THE PERFECT CIRCLE COMPANY, *General Offices*, HAGERSTOWN, INDIANA

Plants at Hagerstown, Newcastle and Tipton, Indiana

PERFECT CIRCLE
PISTON RINGS

Oil-Regulating Type *Double-Duty Type* *Compression Type*

For Lapping Crankshaft Pins and Bearings



TYPE 50 CRANKSHAFT LAPPING MACHINE

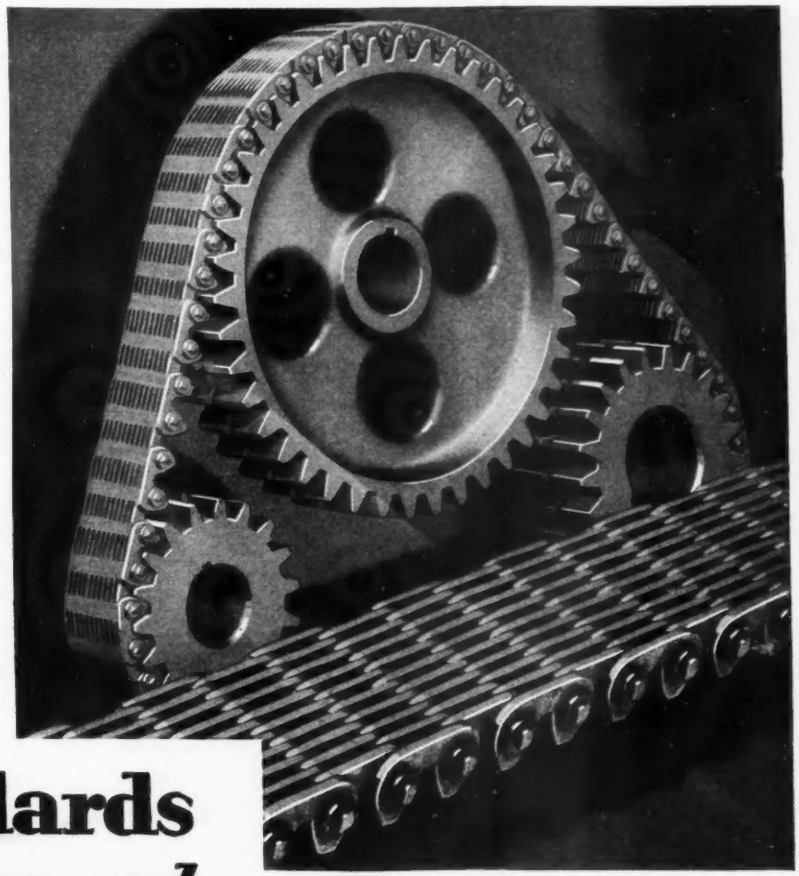
This new Lapping Machine may be arranged to lap with either Abrasive Paper in rolls or Lapping Sticks.

An elevating table greatly reduces fatigue in lifting heavy shafts in and out of the machine, and the duration of the lapping period is automatically timed. All bearings and pins are lapped simultaneously.

Machine Lapping is the last word in finishing crankshafts.

NORTON COMPANY, WORCESTER, MASS.

NORTON
LAPPING MACHINES



New Standards *of* Quietness *and* Dependability

So outstanding has been the performance record of Morse Silent Chains that they are accepted without question by the majority of automotive engineers and manufacturers. On cars large and small, costly and low priced, widely differing in design in many other important details, you will find a truly remarkable agreement of opinion with respect to Morse Silent Chains. Their continued use by many of the best known automotive manufacturers both in America and abroad, is proof enough of their superiority.

MORSE CHAIN COMPANY

Main Office and Works: ITHACA, NEW YORK
Sales and Engineering Office: DETROIT, MICHIGAN

MORSE
GENUINE *SILENT* CHAINS

MORSE EQUIPPED

ADLER SIX
CADILLAC EIGHT
CHRYSLER SIX (66)
CHRYSLER SIX (70)
CHRYSLER SIX (77)
CHRYSLER SIX IMPERIAL
DE SOTO
DODGE BROTHERS SENIOR
DODGE BROTHERS SIX
DODGE BROTHERS BUS
DODGE BROTHERS TRUCK
DURANT (55)
DURANT (65)
DURANT (75)
DURANT FOUR
ERSKINE
ESSEX SIX
FARGO CLIPPER
FIAT SIX (5-90)
GENERAL MOTORS T-11 TRUCK
HUDSON SIX
HUPMOBILE SIX
HUPMOBILE EIGHT
LA SALLE
LINCOLN EIGHT
OAKLAND SIX
(A manufacturer of high grade Eights—name on request)
PEERLESS SIX (80)
PEERLESS SIX (91)
PIERCE ARROW (125)
PONTIAC SIX
REO FLYING CLOUD
REO SPEED WAGON
STEARNS H8-90
STEARNS J8-90
STUDEBAKER-ERSKINE TRUCK
VAUXHALL
WHIPPET FOUR
WHIPPET SIX
CONTINENTAL MOTORS

AND SUCCESS

LESS THAN A THOUSANDTH OF AN INCH AWAY . . . . . .

COMPLAINTS were coming in from customers . . . the product showed rust spots soon after being placed in service. The problem was put up to HANSON-MUNNING.

Solutions were analyzed, anodes examined, cleaning process checked. Everything o. k. Then samples of the product were tested for porosity. The answer was obvious . . . too thin a plate. A slightly heavier deposit . . . less than one thousandth of an inch . . . would have meant success.

Recommendations were made to increase the current density from 2.5 amperes per square foot to 12 amperes per square foot, with just a slight change in the process. In the same length of time, with the same equipment, this concern is now depositing five times the amount of nickel and are marketing a product that will withstand a corrosion test ten times longer than the old product.

No increased labor cost; no new equipment; only a slightly higher metal cost that amounts to nothing when spread over the entire annual production.

HANSON-MUNNING Service is the open road to practical information on plating and polishing. When you consider finishing . . . think of HANSON-MUNNING.

HANSON-MUNNING PRODUCTS
Polishing Machines, Lathes, Plating Equipment, Generators, Barrels, Tanks, Wheels, Abrasives, Buffs, Brushes, Compositions, Cleaners, Anodes and Salts

HANSON MUNNING

Leading manufacturers of polishing and plating equipment and supplies

Hanson-Van Winkle-Munning Co., Matawan, N. J., and Chicago

2989

for 1930 still more cars turn to CARTER

Carter has retained all its 1929 customers and has added to the list for 1930 several of the country's outstanding manufacturers.

To take care of this added production, manufacturing capacity has been increased fifty per cent.

CARTER CARBURETOR CORPORATION
2834-46 North Spring Avenue - St. Louis, Mo.

CARBURETER

a.c.f.

The 12th Annual STATISTICAL ISSUE

AUTOMOTIVE INDUSTRIES

will be published

February 22

The Annual Statistical Issue of *Automotive Industries,* to be published Feb. 22d, will contain in convenient reference form, statistical information, including much that has never before been presented, covering the activities of the entire industry to the end of 1929, together with current basic production and marketing data.

This great reference issue will be in daily use by the administrative, engineering, production and sales departments of passenger car, bus, truck, tractor and airplane plants throughout the coming year; also in the parts, accessory and automotive materials factories which are part of this huge industry.

Plan to be represented as an advertiser.

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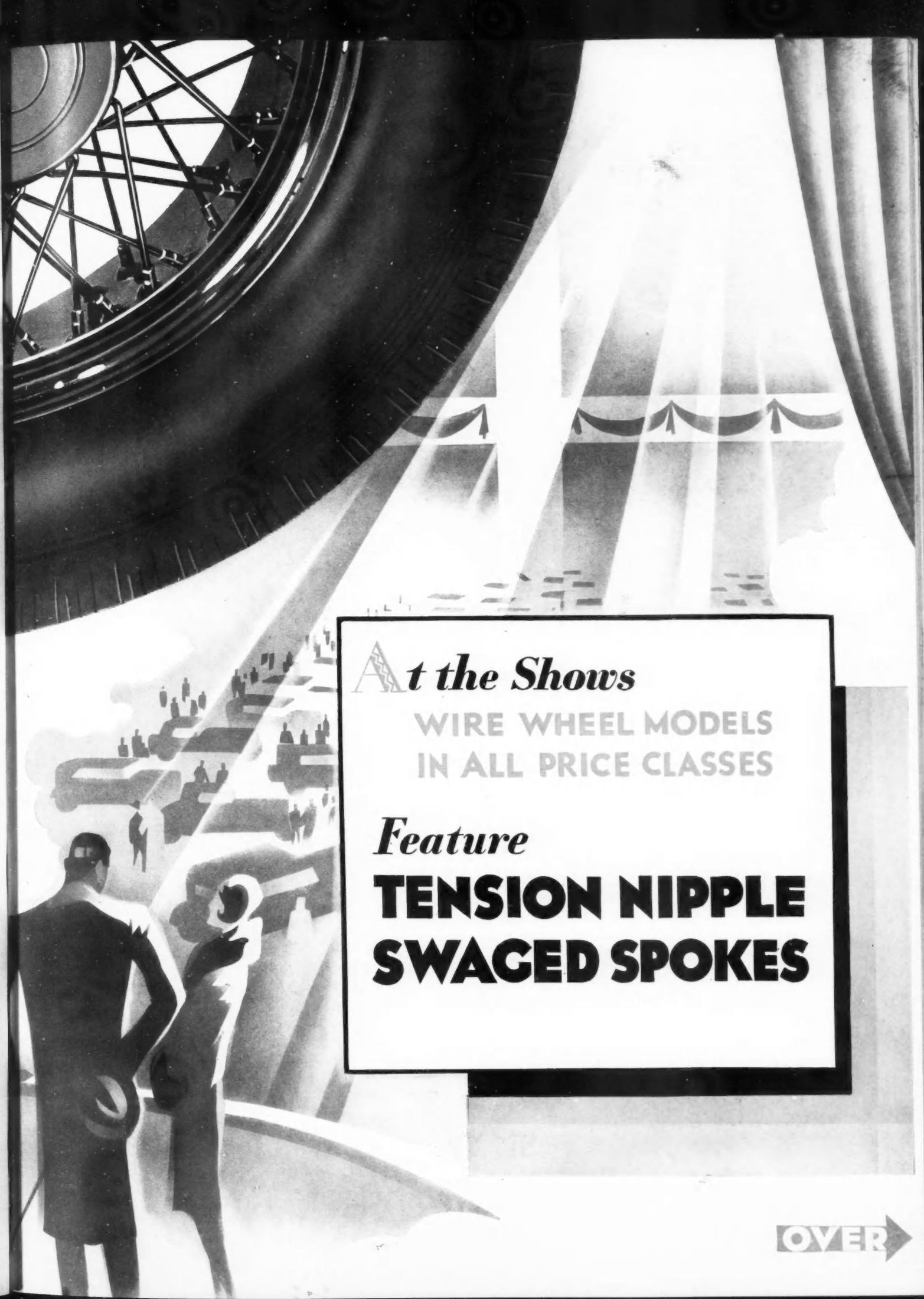
The Issue That Lives for a Year


At the Shows
WIRE WHEEL MODELS
IN ALL PRICE CLASSES
Feature
TENSION NIPPLE
SWAGED SPOKES
OVER

LOOK FOR THE NIPPLE

If it hasn't a NIPPLE it isn't a "TORRINGTON" Swaged Spoke

tage, and that models in all price classes are given extra value through the distinctive Swaged Spoke with its adjustable Nipple.

For alert makers know that the Tension Nipple, Swaged Spoke is extra value, and is recognized as such by the public. The advertising of this better, more beautiful Swaged Spoke for wire wheels is being read by millions of motorists before deciding upon their new cars.

The Tension Nipple, Swaged Spoke wire wheel is an adjustable, even tension wheel. It is the only wheel profiting by the advantages of Swaging. The culmination of its strength and security is the Nipple, which is a threaded nut that locks, or 'anchors', the Spoke securely to the rim.

THE shows reveal the style trends. Look there for the smart, the accepted, the popular.

You will find that the new wire wheel models largely feature the Tension Nipple, Swaged Spoke. That the finest wire wheel cars feature this advantage, and that models in all price classes are given extra value through the distinctive Swaged Spoke with its adjustable Nipple.

Visitors to the shows have been told through The Saturday Evening Post to "Look for the Nipple"—they will look for it in local show rooms. It identifies a unique sales feature which you can turn to your advantage, whether you be manufacturer, distributor or salesman.

Make This Simple Test

Tap the spokes of a wire wheel sharply with a pencil. If each spoke of the same length in the wheel gives the same tone response, the tension on all is uniform. But if some spokes "zing", and others "zong", there is varied tension and the wheel may not run true. Wheels built with the Nipple *can* be adjusted quickly so that ALL spokes have the exact same tension.

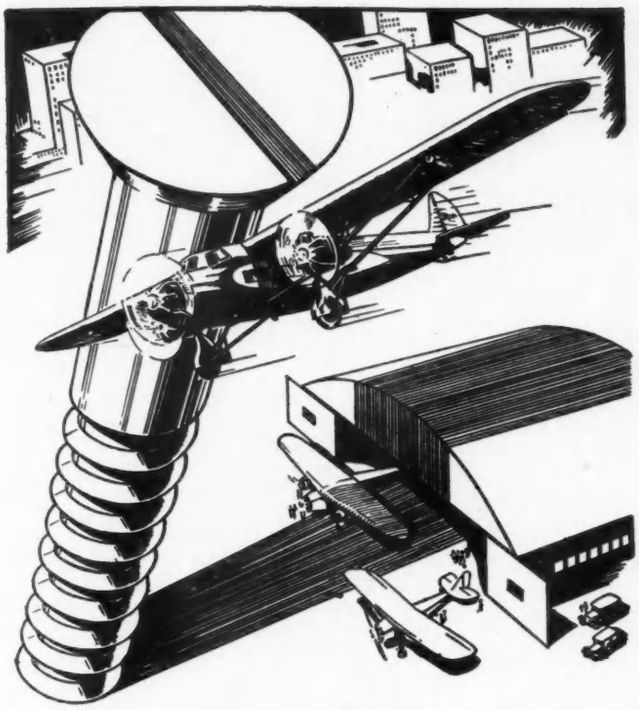
What Swaging Does for Spokes

1—Increases the tensile strength of steel. 2—Refines the grain of the steel. 3—Makes the steel uniformly hard. 4—Gives them their design or shape—tapered, for instance. 5—Increases flexibility. 6—Creates a smooth, hard, even surface to take any finish perfectly.

THE TORRINGTON COMPANY
TORRINGTON *Established 1866* **CONNECTICUT, U.S.A.**

Specialists in the manufacture of precision products such as Swaged Spokes and Nipples, Ball Bearings, etc.

Torrington
SWAGED SPOKES



Little Things That Make A Big Difference

SCREWS are little things but they do the all-important work of holding the various units of construction together.

American Screws have built up a big reputation by doing this job well. They also allow faster production (be it airplanes, automobiles, hangars, homes or furniture).

The strong bodies of American Screws stand the strain of rough treatment; their true running threads will not let go.

You can do any job better with American Screws

MADE IN THE UNITED STATES OF AMERICA 1638

TIRE BOLTS WOOD SCREWS STOVE BOLTS MACHINE SCREWS

AMERICAN SCREW CO.
PROVIDENCE, R.I., U.S.A.
WESTERN DEPOT, 225 WEST RANDOLPH ST. CHICAGO, ILL.

"Put It Together With Screws"

SHULER

FRONT AXLES

for **TRUCKS**
Tractors and Trailers

MEASURED BY NAMES

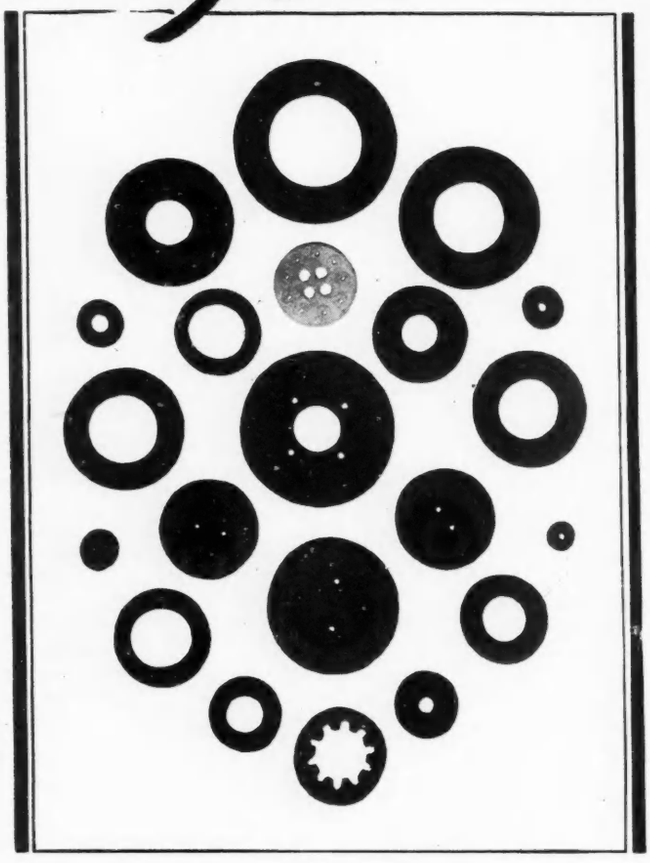
Our list of customers includes names pre-eminent in the industry.

There must be a reason.

FRONT AXLES ONLY
With or Without Brakes

SHULER AXLE CO.
INCORPORATED
LOUISVILLE KENTUCKY

American *Felt* Products



Approved Automotive Felts

Automotive Felt of our own manufacture from which we cut standard or special parts to your specifications. Felt that has met the approval of better car manufacturers since the birth of the industry.

Felt products with the stamp of approval are obtainable from our seven conveniently located warehouses . . . as well as from the cutting plant in Detroit, the heart of the industry.

Estimates gladly submitted.

American Felt Company

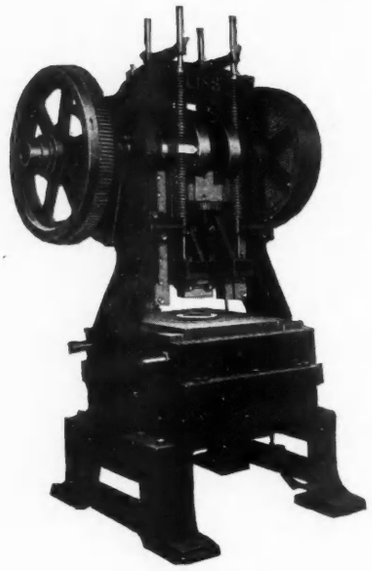
TRADE MARK

Largest Manufacturers of Felt in the World

NEW YORK .....114 E. 13th St
PHILADELPHIA.....37 Drexel Bldg.
CHICAGO .....325 S. Market St.
DETROIT.....1915 W. Fort St.
ST. LOUIS .....1627 Locust St.
BOSTON .....213 Congress St.
SAN FRANCISCO .....833 Market St.

BLISS

TRIM ECONOMICALLY



BLISS FLAT EDGE TRIMMERS

Many designers of pressed metal parts are not yet familiar with the possibilities opened up by this new type of equipment. Those who are have already accomplished much in electrical, silver-ware, brass-ware, and miscellaneous lines.

A short motion front and back, and right and left from center, of the die or outer cutting member with reference to the punch or inner cutting member which is rigidly held, gives a clean square cut without joint marks. A floating pad on the punch locates the work, insuring a uniform height of trim line.

A piece with notches, hinge lugs or different trim levels can be trimmed as quickly and easily as a simple straight edged shell of any shape.

The machines are carefully built to give speed with accuracy and reliability. They are carried in stock in three sizes.

"Bliss" on your machinery is more than a name; it's a guarantee.

E. W. BLISS CO., BROOKLYN, N. Y., U.S.A.

Factories: Brooklyn, N. Y. Hastings, Mich. Salem, O.
Sales Offices: Detroit Cleveland Chicago Boston Philadelphia Cincinnati New Haven Rochester
Foreign Factories and Offices: London, Eng. Turin, Italy Paris, France

Factory for Sale $150,000.00

IN a city near Detroit with ideal working conditions. 70,000 sq. ft. Single story of the most modern construction, practically new, and with ample land for expansion. The most attractive proposition in the country for any kind of manufacturing.

Write Box 815

AUTOMOTIVE INDUSTRIES

Philadelphia **Pennsylvania**

AUTOMOTIVE INDUSTRIES

This publication enters more than 2000 plants making automotive parts for original equipment and replacement, accessories, bodies, tractors, motor cycles and aircraft besides those making buses, trucks and passenger cars. The world's largest market for production machinery and plant equipment!

"We have been advertising consistently in *Automotive Industries* for the past ten years, and when schedules are prepared, your publication is always our first choice in the automotive field, as it reaches a group in which we are interested particularly."

Veeder-Root
HUB ODOMETERS

Tell the story of truck-performance as indicated by *mileage-records*. Prove to owners the long-run value of your principles of construction and operation. Enable your users to determine and *hold to* the minimum operating cost for your job. Regular model, adaptable to all standard trucks, $20 list. (For *Model A* Fords, complete with threaded hub for attaching, $21.) Ask for informative circulars.

Veeder-Root INCORPORATED
HARTFORD, CONN.

Cut Your Costs

By the use of Die Cast Parts

Illustrated here are only a few castings where substantial savings have been effected, due to partial, and in some cases, total elimination of costly machining operations. Castings made from Aluminum, Zinc, Lead and Tin Base metals, alloyed to suit your particular requirements.

Send Blue Prints or Samples for Quotations

DIE CASTING DIVISION

Barnhart Brothers & Spindler

Monroe and Throop Streets, Chicago

AMERICAN
SHEET AND TIN PLATE COMPANY
PITTSBURGH
TRADE MARK REG. U.S. PAT. OFF.

STEEL
SHEETS

For Automobile Construction Bodies and Parts

This Company specializes in the manufacture of high grade sheets for all uses in the automotive industry: AMERICAN AUTOMOBILE SHEETS, Body Sheets, Panel Sheets, Fender and Hood Stock, Deep Drawing and Stamping Sheets, Long Ternes, Etc.

AMERICAN SHEET AND TIN PLATE COMPANY, Pittsburgh, Pa.
SUBSIDIARY OF UNITED STATES STEEL CORPORATION

SHEETS

Can We Help You?

When manufacturers are looking for additional sales representatives familiar with industrial selling in the automotive field *Automotive Industries* is frequently able to be of help in finding them. Nearly always it is possible for us to suggest some one experienced and successful in this line, in such cities as Detroit, Cleveland, Indianapolis, Chicago or New York. We are always glad to render this service without recompense or obligation.

If you desire to make arrangements for sales representation in these or other automotive industrial centres, we suggest that you write to

Controlled by the United Business Publishers, Inc.

The Business Manager
AUTOMOTIVE INDUSTRIES
Chestnut and 56th Sts.
Philadelphia

SCIENTIFIC MATHER SPRINGS

Mather Springs are a daily example of the economy of quality.

THE MATHER SPRING CO., TOLEDO, OHIO

Manufacturers of Scientifically Heat Treated Automobile Springs

HOOVER

The Product of America's Foremost Ball Plant

BALLS

BALL BEARINGS
(annular and thrust)

ROLLER BEARINGS
(tapered)

Let us figure with you.

HOOVER STEEL BALL COMPANY
Ann Arbor, Michigan
Branches: Chicago, Brooklyn, N. Y., San Francisco.

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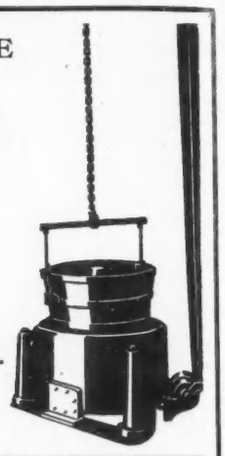

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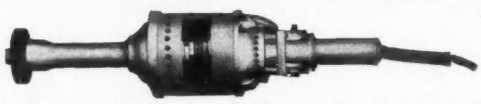

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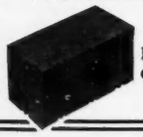
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American Felt Co.
Western Felt Works
Fibrous
Victor Mfg. & Gasket Co.

Gauges
Danly Machine Specialties, Inc.
Johansson, C. E. (Inspection & Precision)

Gear Cutting Machines
Brown & Sharpe Mfg. Co.
Fellows Gear Shaper Co. (Shapers)

Gear Material
Non-Metallic
Bakelite Corp.
Continental - Diamond Fibre Co.

Gears
Flywheel Ring
Springfield Mfg. Co.
Timing, Metallic
Canton Forge & Axle Co.
Gears & Forgings, Inc.
Link-Belt Co.
Timing, Non-Metallic
Continental - Diamond Fibre Co.
Gears & Forgings, Inc.
Waukesha Motor Co.
Transmission
Brown-Line Gear Co.
Gears & Forgings, Inc.

Governors, Vehicle Speed
Handy Governor Corp.
Kingston Products Corp.

Grinders
Black & Decker Mfg. Co. (Elec.)
LeBlond Machine Tool Co., R. K.
Schauer Machine Co.
Van Dorn Elec. Tool Co.

Grinding Machines
Brown & Sharpe Mfg. Co.
Bryant Chucking Grinder Co.
Cincinnati Grinders, Inc.
Fellows Gear Shaper Co.
Heald Machine Co.
Landis Tool Co.
Norton Company
Potter & Johnston Machine Tool Co.
Internal
Bryant Chucking Grinder Co.
Heald Machine Co.
Surface
Bryant Chucking Grinder Co.
Heald Machine Co.
Norton Company
Tool
Cincinnati Grinders, Inc.
LeBlond Machine Tool Co., R. K.
Universal
Landis Tool Co.
Norton Company
Valve Seat
Black & Decker Mfg. Co.
Foote-Burt Co.

Grinding Wheels
Norton Company

Hair, Curled & Woven
Blocksom & Co.

Hammers, Power
Chambersburg Engineering Co.
Chambersburg-National Co.
Erie Foundry Co.
National Machinery Co.

Hangers, Shafting
New Departure Mfg. Co.

Hardware, Body
Mitchell Specialty Co.

Hobs
Brown & Sharpe Mfg. Co.

Hoists
Hanna Engineering Works

Hose Clamps
Konigslow Mfg. Co., Otto

Hose, Radiator
Titeflex Metal Hose Co.

Housings, Axle
Bossert Corp.

Insulating Material
Bakelite Corp.
Continental - Diamond Fibre Co.

Keys
Moltrup Steel Prod. Co.

Lacquer
Armitage & Co., John L.

Lapping Machines
Norton Company

Laps
Danly Machine Specialties, Inc.

Lathe Attachments
Seneca Falls Mach. Co.

Lathes
Automatic
LeBlond Machine Tool Co., R. K.
Seneca Falls Mach. Co.
Automatic Chucking
Bullard Co.
Goss & DeLeeuw Machine Co.
Axle Turning
Seneca Falls Mach. Co.
Crankshaft Turning
LeBlond Machine Tool Co., R. K.
Seneca Falls Mach. Co.
Engine
Seneca Falls Mach. Co.
Multiple Spindle
Bullard Co.
Turret
Potter & Johnston Machine Tool Co.
Vertical Turret
Bullard Co.

Locks
Ignition
Mitchell Specialty Co.
Tire
Baird Lock Co.

Lubricating Systems Centrally Located
Adams Grease Gun Corp.
Bijur Lubricating Corp.

Lubricators
Chassis
Adams Grease Gun Corp.
Gits Bros. Mfg. Co.
McCord Radiator & Mfg. Co.

Lumber, Dimension
Mengel Co.

Machine Work (General)
Konigslow Mfg. Co., Otto

Milling Machines
Brown & Sharpe Mfg. Co.
LeBlond Machine Tool Co., R. K.
Rockford Drilling Mach. Co.
Universal
LeBlond Machine Tool Co., R. K.

Motors
Electric Power
Allis-Chalmers Mfg. Co.

Molded or Machined Parts (Phenolic)
Bakelite Corp.
Continental - Diamond Fibre Co.

Mufflers
Powell Muffler Co.

Nickel
International Nickel Co.

Nut Setters, Power
Schauer Machine Co. (Electric)

Odometers
Veeder-Root, Inc.

Ovens
Baking, Paint & Lacquer
Kirk & Blum Mfg. Co.
Core
Holcroft & Co.

Packing
Fibrous
Victor Mfg. & Gasket Co.

Pads
Felt
American Felt Co.
Western Felt Works
Hair
Blocksom & Co.

Paints
Heat Resisting
American Chemical Paint Co.
Armitage & Co., John L.

Parts, Wood Body
Mengel Co.

Pickling Compounds
American Chemical Paint Co.

Pins
Dowel & Leader
Danly Machine Specialties, Inc.

Pipes
Exhaust
Powell Muffler Co.

Piston Pins
Ottawa Steel Products, Inc.

Piston Rings
Perfect Circle Co.

Plates, Core & Pattern
Moltrup Steel Prods. Co.

Platform & Transport Lift Trucks
Factory Service Co.

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Hanson-Van Winkle-Munning Co.
Vanadium Corp. of America

Plugs, Expansion
Hubbard Spring Co.

Polishing Supplies
Hanson-Van Winkle-Munning Co.

Powerplants, Industrial
Allis-Chalmers Mfg. Co.
Waukesha Motor Co. (Portable)

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Chambersburg Engineering Co.
Chambersburg-National Co.
Cleveland Punch & Shear Works Co.
Erie Foundry Co.
Ferracute Machine Co.
Hanna Engineering Works
Henry & Wright Mfg. Co.
National Machinery Co.

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Dole Valve Co.

Pumps
Fuel
Kingston Products Corp.
General Service
Allis-Chalmers Mfg. Co.
Lubricating
Adams Grease Gun Corp.
Cleveland Steel Products Corp.

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Cleveland Punch & Shear Works Co.
Ferracute Machine Co.

Radiators
Harrison Radiator Corp.
McCord Radiator & Mfg. Co.

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Brubaker & Sons Co., W. L.
Clark Equipment Co.

Removers, Enamel and Paint
American Chemical Paint Co.
Rex Products & Mfg. Co.

Riveters
Hanna Engineering Works

Riveting Machines
Hanna Engineering Works
Taylor-Winfield Corp.

Rivets
The Atlas Bolt & Screw Co.
Russell, Burdsall & Ward Bolt & Nut Co.

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Ottawa Steel Prods., Inc.

Rolling Mills
Bliss Co., E. W.

Running Boards
Wood
Mengel Co.

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American Chemical Paint Co.
Rex Products & Mfg. Co.

Saws, Hot Cutting
Ajax Mfg. Co.

Screw Drivers, Power
Black & Decker Mfg. Co. (Electric)
Schauer Machine Co. (Electric)

Screw Machine Products
National Acme Co.
Shimer, Samuel J., & Sons

Screw Machines
Brown & Sharpe Mfg. Co.
Cleveland Automatic Machine Co.
Greenlee Bros. & Co.
National Acme Co.
Potter & Johnston Machine Tool Co.

Screws
Cap
The Atlas Bolt & Screw Co.
Strong, Carlisle & Hammond Co.
Drive
Elco Tool & Screw Corp.
Hollow
Strong, Carlisle & Hammond Co.
Lag
Buffalo Bolt Co.
Machine
American Screw Co.
The Atlas Bolt & Screw Co.
Elco Tool & Screw Corp.
Set
The Atlas Bolt & Screw Co.
Shimer, Samuel J. & Sons
Strong, Carlisle & Hammond Co.
Wood
American Screw Co.
Elco Tool & Screw Corp.

Separators, Oil
Tolhurst Machine Works, Inc.

Shafting
Bliss & Laughlin, Inc. (Turned & Polished)
Moltrup Steel Prods. Co.
New Departure Mfg. Co.

Shafts, Axle, Propeller & Transmission
Cleveland Steel Products Corp.
Pittsburgh Steel Prods. Co. (Propeller)
Witherow Steel Co.

Shafts, Distributor Arm
Ottawa Steel Prods., Inc.

Shafts, Fan Pump & Rocker Arm
Ottawa Steel Prods., Inc.

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Bliss Co., E. W.
Cleveland Punch & Shears Works Co.
Ferrachute Machine Co.

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Cleveland Punch & Shear Works
Ferracute Machine Co.
Henry & Wright Mfg. Co.

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Nat'l Motor Bearing Co., Inc.
Victor Mfg. & Gasket Co.

Shock Absorbers
Landis Engineering & Mfg. Co.

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Cleveland Automatic Machine Co.
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Trundle Engineering Co.

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Gears & Forgings, Inc.

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Torrington Co.

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DeVilbiss Co.

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Gibson Co., Wm. D.
Hubbard Spring Co.
Raymond Mfg. Co.
Wallace Barnes Co.
Leaf
Eaton Axle & Spring Co.
Mather Spring Co.

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Acklin Stamping Co.
Adams Grease Gun Corp.
Barnes, Gibson, Raymond, Inc.
Bossert Corp.
Gibson Co., Wm. D.
Hubbard Spring Co.
Indiana Pressed Steel Co.
Konigslow Mfg. Co.
Mitchell Specialty Co.
Motor Wheel Corp.
Raymond Mfg. Co.
Wallace Barnes Co.

Steel
Alloy
Carpenter Steel Co.
Central Alloy Steel Corp.
Firth-Sterling Steel Co.
Illinois Steel Co.
Timken Roller Bearing Co.
Bars
Illinois Steel Co.
Timken Roller Bearing Co.
Billets
Illinois Steel Co.
Timken Roller Bearing Co.
Carbon
Carpenter Steel Co.
Firth-Sterling Steel Co.
Illinois Steel Co.
Timken Roller Bearing Co.
Cold Drawn
Bliss & Laughlin, Inc.
Moltrup Steel Prod. Co.
Deep Drawing
American Sheet & Tin Plate Co.
Electric Furnace
Carpenter Steel Co.
Central Alloy Steel Corp.
Timken Roller Bearing Co.
High Speed
Carpenter Steel Co.
Firth-Sterling Steel Co.
Long Terne
American Sheet & Tin Plate Co.
Shapes
Illinois Steel Co.
Sheets
American Sheet & Tin Plate Co.
Central Alloy Steel Corp.
The Newton Steel Co.
Republic Iron & Steel Co.
Seneca Iron & Steel Co.
Stainless
American Stainless Steel Co.
Carpenter Steel Co.
Central Alloy Steel Corp.
Firth-Sterling Steel Co.
Strip
Carpenter Steel Co.
Central Alloy Steel Corp.
Tool
Carpenter Steel Co.
Firth-Sterling Steel Co.
Timken Roller Bearing Co.

Steering Gears
Gemmer Mfg. Co.

Steering Knuckle Pins
Ottawa Steel Prods., Inc.

Steering Wheels
Acklin Stamping Co.

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Konigslow Mfg. Co., Otto

Tapping Machines
Greenlee Bros. & Co.

Thermostats
Dole Valve Co.

Thread Generators
Fellows Gear Shaper Co.

Tools, Small
Brown & Sharpe Mfg. Co.
Brubaker & Sons Co.
Williams & Co., J. H.

Transformers, Electric
Allis-Chalmers Mfg. Co.

Transmissions
Brown-Lipe Gear Co.

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Factory Service Co.

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Globe Steel Tube Co.
Pittsburgh Steel Prods. Co.

Tubing
Brass & Copper
Wolverine Tube Co.
Flexible Metal
Titeflex Metal Hose Co.
Steel
Globe Steel Tube Co.
Pittsburgh Steel Prods. Co.

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Bullard Co.

Universal Joints
Cleveland Steel Products Corp.
Mechanics Universal Joint Co.

Upsetting Machines
Ajax Mfg. Co.

Vacuum Tanks
Kingston Products Corp.

Vanadium
Vanadium Corp. of America

Varnishes
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Bakelite Corp.

Visors, Windshield
Carter Carburetor Co.

Washers
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Victor Mfg. & Gasket Co.
Copper
Victor Mfg. & Gasket Co.
Felt
American Felt Co.
Western Felt Works
Lock
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Plain Metal
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Hubbard Spring Co.
Raymond Mfg. Co.
Wallace Barnes Co.

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Wheels
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Clark Equipment Co.
Erie Malleable Iron Co.
Kelsey Hayes Wheel Corp.
Motor Wheel Corp.

Wicks, Felt
American Felt Co.
Western Felt Works

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American Spring & Mfg. Co.

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Black & Decker Mfg. Co.
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The Trundle Engineering Co.
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Cleveland, Ohio

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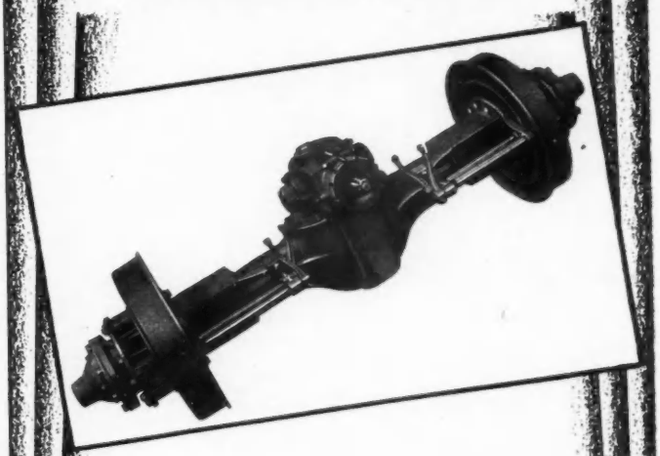
WISCONSIN AXLES



Headquarters

NATIONAL AUTOMOBILE SHOW
New York
January 4th to January 11th
HOTEL COMMODORE

AMERICAN ROAD BUILDERS CONVENTION
Atlantic City
January 4th to January 18th
THE RITZ-CARLTON

WISCONSIN AXLE CO.
Oshkosh Wisconsin
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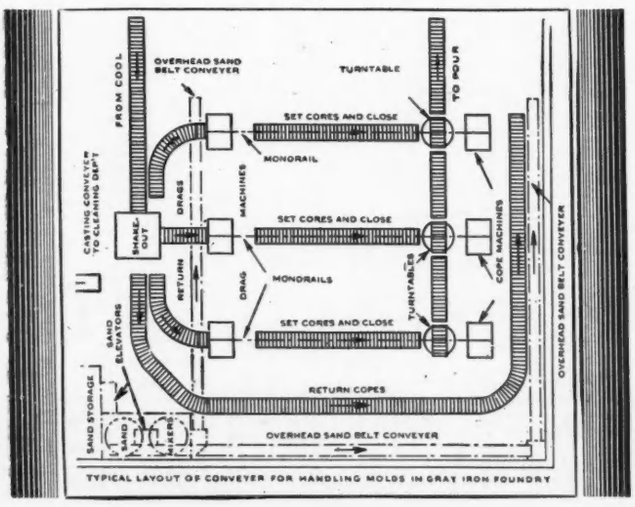

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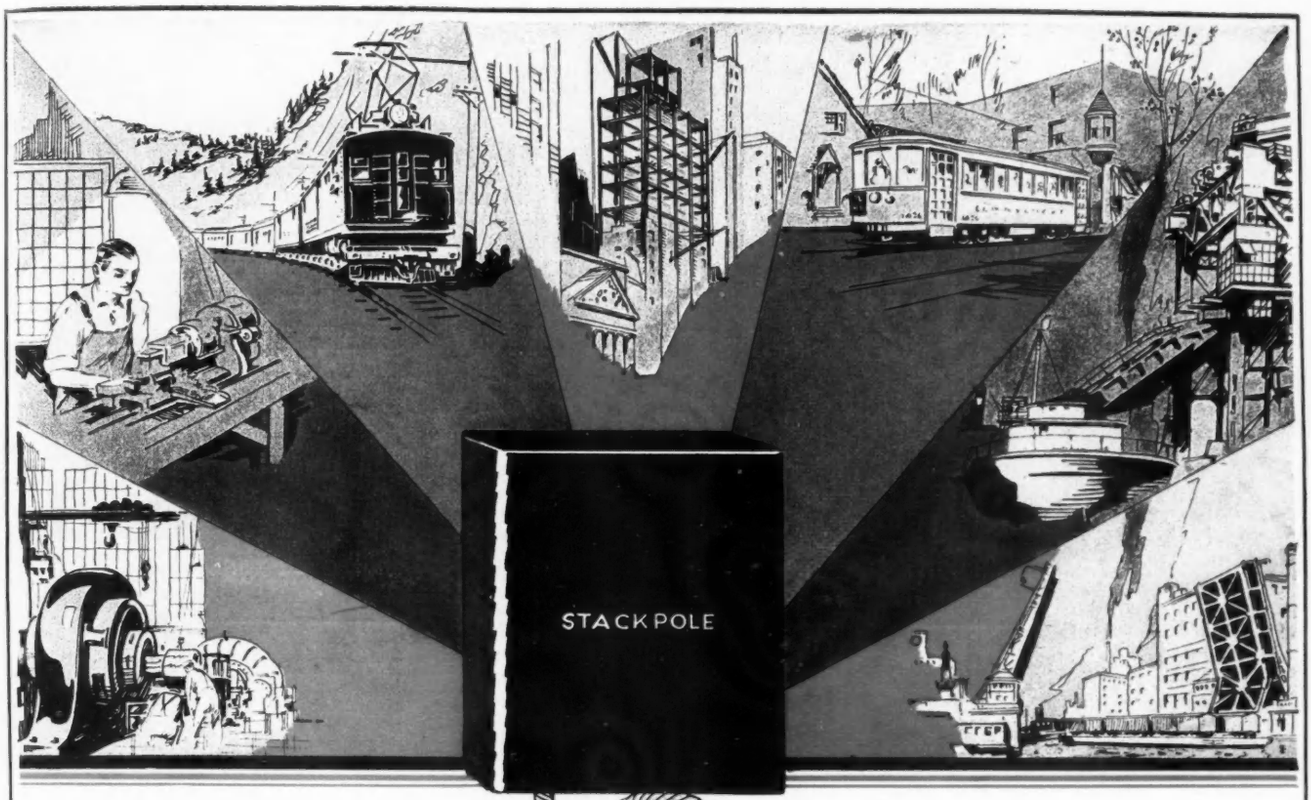

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ST. MARYS, PENNA.

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Carburetion
WITH AUTOMATIC HEAT CONTROL

APPLIED AT THE THROTTLE

A SYSTEM that Entails Perfect Co-ordination of **The Two Major Divisions** of Carburetion—Metering and Proper Vaporization.

A **Carbureter Unit** designed to provide efficient metering of the fuel in all phases of engine operation.

A **Vaporizing Unit** utilizing the exhaust gases, designed to automatically control the mixture temperature to any **Predetermined** requirement. (This range of automatic control provides dry mixture where required and will not reduce the maximum power on wide open throttle.)

RESULTS

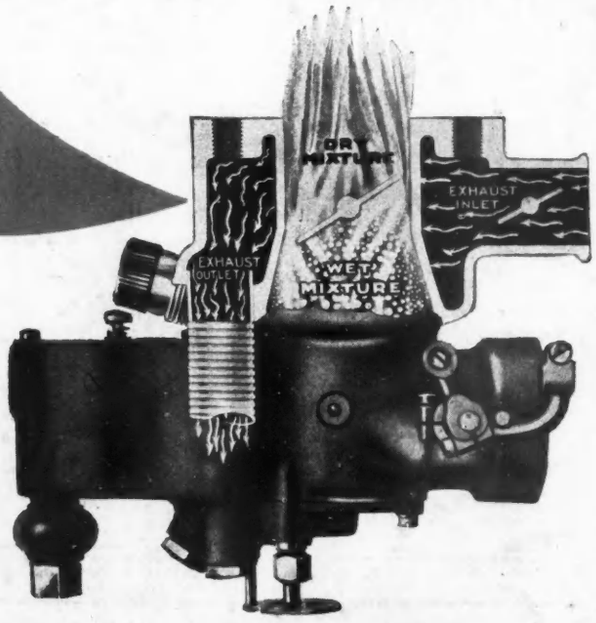
1. Standard performance throughout the year, in winter or in summer, with maximum fuel economy regardless of weather conditions.

2. No winter or summer seasonal adjustments of the mixture ratios—one standard setting that has been accurately established, and all carbureters individually checked to same on fuel flow meter before leaving factory.

3. Full use of the exhaust heat from all cylinders reduces the time element for "Winter Warm Up" to a negligible factor, and prevents a useless waste of gasoline.

4. This Marvel advantage means—minimum choker manipulation, less carbon deposits and freedom from plug and valve trouble.

MARVEL CARBURETER COMPANY
FLINT — MICHIGAN



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OAKLAND **PONTIAC**
HUDSON **ESSEX**
MARQUETTE